

KODAK X-OMATIC Identification Camera, Models 2, 2-L, and 2-L60 and KODAK MIN-R and MIN-R L Identification Cameras



HEALTH SCIENCES DIVISION

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CAUTION



This equipment includes parts and assemblies sensitive to damage from electrostatic discharge. Use caution to prevent damage during all service procedures.

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SECTION 1

Description and Specifications

Description

The *Kodak X-Omatic* IDENTIFICATION CAMERA, MODELS 2, 2-L, and 2-L60 record up to 3 lines of patient identification data onto x-ray film in lighttight *Kodak X-Omatic* CASSETTES C-1 or *Kodaflex* CASSETTES.

The *Kodak Min-R* and *Min-R L* IDENTIFICATION CAMERAS record up to 5 lines of patient identification data onto x-ray film in lighttight *Kodak Min-R 2* CASSETTES.

The CAMERAS provide:

- Excellent image quality with a high-quality lens
- Operation in **normal** room illumination
- The exact time and date of the exposure recorded on the film

When you insert a CASSETTE correctly into the SLOT above the BASE, the CAMERAS automatically:

- [1] Actuate a mechanical ARM to open a WINDOW in the CASSETTE and actuate the SHUTTER.
- [2] Illuminate the LAMP to record the identification data, time, and date on the film.
- [3] Close the WINDOW in the CASSETTE.

This entire operation takes approximately 1 second.

Specifications

Space Requirements

- The physical characteristics of the CAMERA are:

Height: 35 cm (13 $\frac{3}{4}$ in.)

Width: 31.5 cm (12 $\frac{3}{8}$ in.)

Depth: 41.5 cm (16 $\frac{3}{8}$ in.)

Weight: 9.8 kg (21.6 pounds), Model 2 and *Min-R* Cameras

12.4 kg (27.3 pounds), Models 2-L, 2-L60, and *Min-R L* Cameras

- Install the CAMERA on a flat surface, approximately 75 cm (30 in.) in height.
- To be able to insert the largest CASSETTES, provide these clearances:

1 metre (3 ft) between the **front** edge of the CAMERA and the nearest wall

1 metre (3 ft) between the **right** edge of the CAMERA and the nearest wall

See Figure 2 on page 2-3.

Environmental Requirements

The CAMERA operates in the ambient room conditions normally encountered in an x-ray department:

15 - 30°C (59 - 86°F)

18 - 76% relative humidity

Cassettes

You can use all sizes of *Kodak X-Omatic* CASSETTES C-1 and *Kodaflex* CASSETTES in MODELS 2, 2-L, and 2-L60. Use *Kodak Min-R 2* CASSETTES in the *Kodak Min-R* and *Min-R L* IDENTIFICATION CAMERAS.

Power Requirements

[1] For the Model 2 and the *Min-R* Cameras:

These CAMERAS must have a 120 V AC $\pm 10\%$ power source, 60 Hz. If the power is **not** within this range, you must install an external TRANSFORMER.

For the Model 2-L and *Min-R L* Cameras:

These CAMERAS are made to work on a 240 V AC $\pm 10\%$ power source, 50 Hz. If the power is not 240 V, you can still use the CAMERA. However, you **must change** the connections to the TRANSFORMER inside the CAMERA. See page 2-2 for more information about these special connections to the TRANSFORMER.

For the Model 2-L60 Camera: This CAMERA is made to work on a

220 V AC $\pm 10\%$ power source, 60 Hz. If the power is not 220 V, you can still use the CAMERA. However, you **must change** the connections to the TRANSFORMER inside the CAMERA. See page 2-2 for more information about these special connections to the TRANSFORMER.

- [2] Do **not** connect the CAMERA to a power source that serves other equipment.
- [3] Small variations in the voltage can cause variations in the density of the film. If necessary, install a voltage regulator for a constant AC voltage to the CAMERA.
- [4] Use a reliable ground.
- [5] Use the correct FUSE for the current.

Identification Camera - Main Power Specifications

Camera	Frequency (Hz)	Current (Amps)	Voltage (V AC $\pm 10\%$)
Model 2	60	2.5	120
Model 2-L	50	2.5 1.6 1.6 1.6	120 200 220 240
Model 2-L60	60	2.5 1.6 1.6 1.6	120 200 220 240
<i>Min-R</i>	60	2.5	120
<i>Min-R L</i>	50	2.5 1.6 1.6 1.6	120 200 220 240

SECTION 2

Installation

- [1] Install the CAMERA on a table or other flat surface with a **height** of approximately 75 cm (30 in.). Allow 1 metre (3 ft) of **clearance** at both the right side and the front of the CAMERA.
- [2] Fasten the CAMERA to the table or flat surface.

NOTE

- Figure 2 shows the front of the CAMERA aligned with the **front** of the table. If necessary, you can align the front of the CAMERA with the **left side** of the table.
 - If you do not want to drill holes in the table, install a FOOT ASSEMBLY in each of the 4 tapped holes in the bottom of the BASE of the CAMERA. See page 10-12.
- (a) Drill 4 holes through the top of the table. Use a 10 mm (3/8-in.) drill bit. See Figure 2 for the positions of these holes.
 - (b) Align the 4 tapped holes in the bottom of the BASE of the CAMERA over the 4 holes in the table.
 - (c) Install a THREADED ROD through each of the 4 holes in the table and into the 4 holes in the BASE. **Do NOT fully tighten.**
 - (d) Install a WASHER and a NUT on each of the 4 THREADED RODS. Do NOT fully tighten the 4 NUTS.
 - (e) Install and fully tighten another NUT on each of the 4 THREADED RODS.

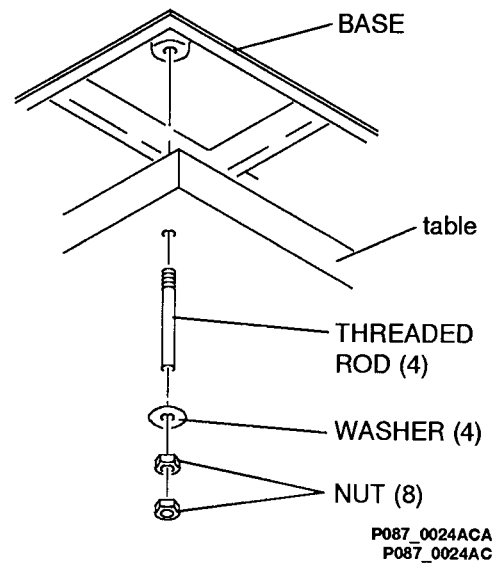


Figure 1 Installation on a Table

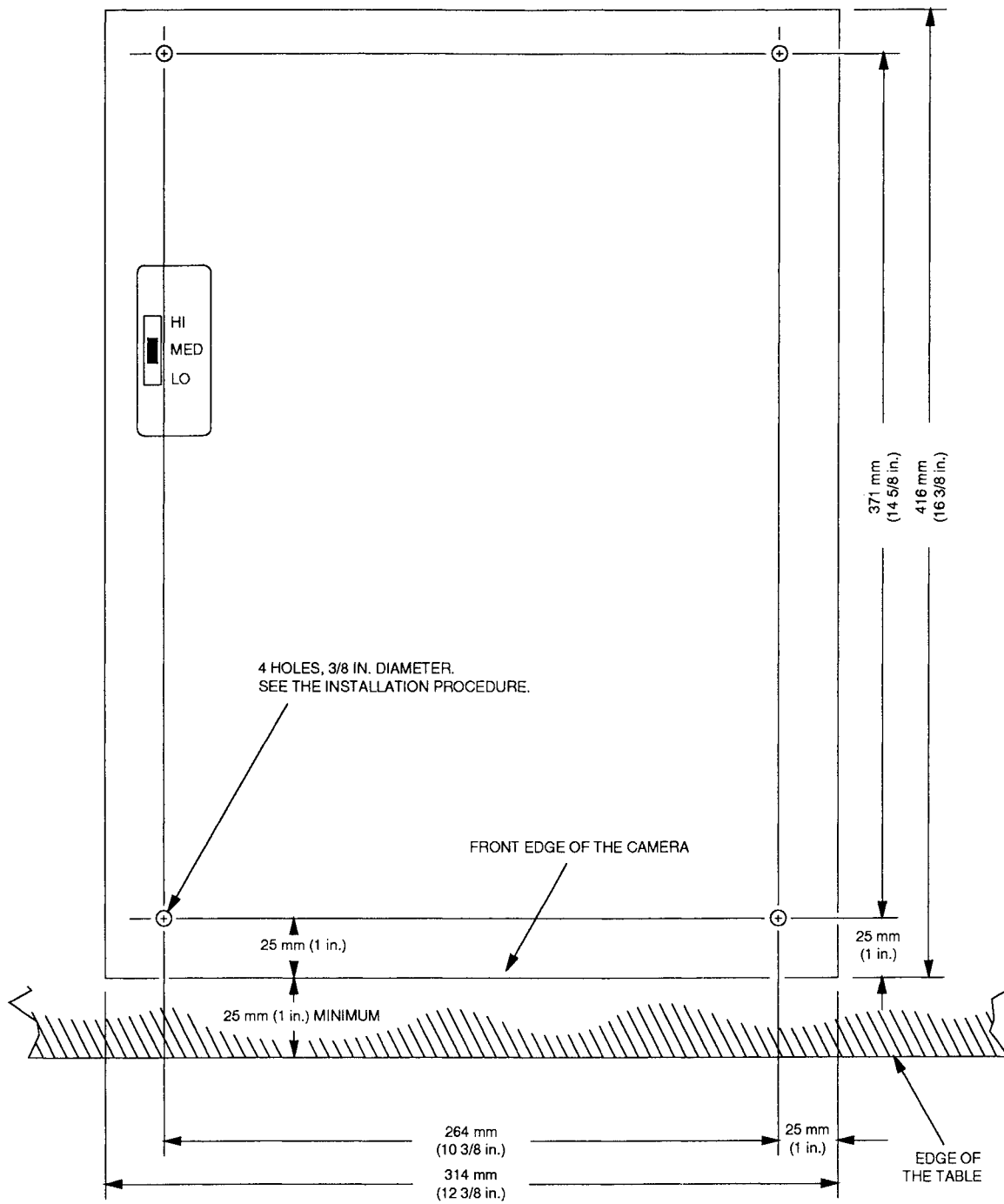
- [3] Remove any packing material around the LAMP and connect the CAMERA to an AC power source.
- **Model 2 Camera and *Min-R* Camera** must have a power source of 120 V AC $\pm 10\%$. If the voltage is not within this range, **you must use an external TRANSFORMER** to obtain the necessary input voltage.
 - **Model 2-L and 2-L60 Cameras and *Min-R* L Camera** will work on several voltages. **Before you install one of these CAMERAS**, measure the voltage of the main power, and make the necessary connection on the TRANSFORMER inside the CAMERA. See the table below.

Connections to the Internal Transformer

Main Power Source			Connect the KRN (Black-Red-Brown) Wire inside the Transformer to this Terminal
Model	Hz	V AC $\pm 10\%$	
2-L or <i>Min-R</i> L	50	120*	TB2-3
	50	200	TB2-6
	50	220	TB2-5
	50	240	TB2-4
2-L60	60	120*	TB2-3
	60	200	TB2-6
	60	220	TB2-5
	60	240	TB2-4

CAUTION

* To use a Model 2-L, 2-L60, or *Min-R* L Camera with a 50 Hz, 120 V power source, you must install a **2.5 A FUSE**.



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**Figure 2 Position of the Holes in the Bottom of the
Kodak Identification Cameras**

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SECTION 3

Setup

NOTE

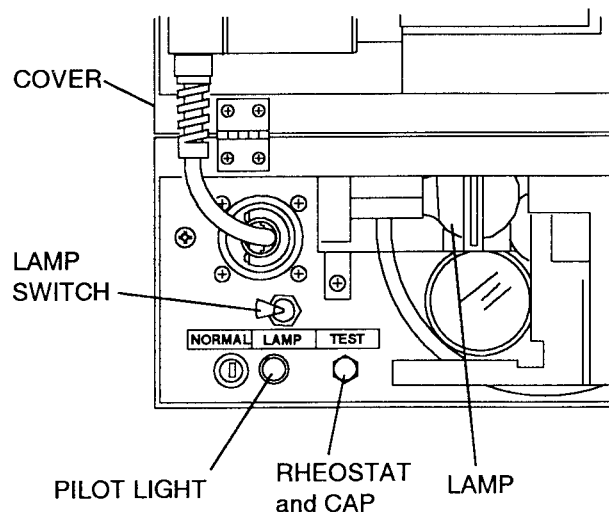
Do the following steps **before** you record identification data on x-rays of patients.

- [1] Open the COVER on the top of the CAMERA.
- [2] Remove any packing material that is around the LAMP.
- [3] Energize the CAMERA.

NOTE

The PILOT LIGHT on the Model 2-L, 2-L60, and *Min-R* L CAMERAS will illuminate whenever the CAMERA is connected to a power source.

- [4] Move the LAMP SWITCH to "TEST". If the LAMP illuminates, move the LAMP SWITCH to "NORMAL" and continue with Step [5]. If the LAMP does not illuminate, see:
 - "Replacement of the Lamp" on page 5-1 or
 - "Diagnostic Procedures" in Section 8

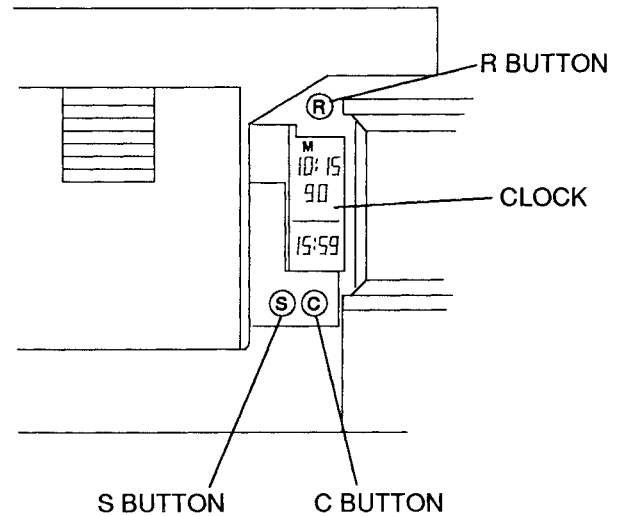


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Figure 3 Lamp Switch

- [5] Check that the CLOCK that is inside the COVER is correctly set. To change the time and date:

- (a) Press the S BUTTON to select the field you want to set: day, month, year, hour, minute, or month location. The selected field will blink. Continue to press the S BUTTON until the field that you want to change blinks.
- (b) To change the value of the selected field, press the C BUTTON. Continue pressing the C BUTTON, until the CLOCK displays the number you want in that field.



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Figure 4 Clock Settings

NOTE

- If you wait longer than 5 seconds between pressing the S BUTTON and the C BUTTON, you will have to press the S BUTTON again.
- The CLOCK can display the date in 2 formats: month/day/year or day/month/year. The month location field sets the format. The CLOCK will display an "M" above the month.
- When you select the month location field and then press the C BUTTON, you reverse the month and day. The "M" will move with the month to the new position.
- The CLOCK allows you to set non-valid dates while you are setting the fields. But in 5 seconds, it will reset to the first day of the month. For example, if you set the day to "30" or "31" and the month to February, in 5 seconds the CLOCK will change the date to "01:02", or to "02:01" if the month location is first.
- When you install a new battery or if the CLOCK malfunctions, press the R BUTTON. All the numbers will blink 5 times. The CLOCK will then display the default date and time. Do Step [5] to set the correct time and date.

NOTE

The brightness, or intensity, of the LAMP is factory-set to produce the correct density on most x-ray films.

- [6] Before you record identification data on patients' x-ray images, make a test exposure.

- (a) Load a sheet of x-ray film into a CASSETTE.
- (b) Insert an IDENTIFICATION CARD with patient's data under the CARD HOLDER.
- (c) Place the CASSETTE on the BASE with the WINDOW of the CASSETTE in the upper left corner. The left side of the CASSETTE must be flush with the thick section of the BASE.

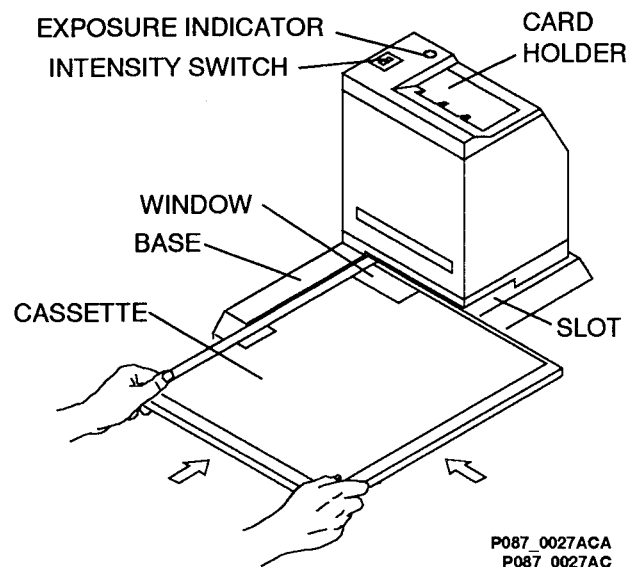


Figure 5 Inserting a Cassette

IMPORTANT

Do not move the CASSETTE during the exposure. The EXPOSURE INDICATOR will illuminate during the exposure.

- (d) Fully insert the CASSETTE into the SLOT above the BASE. The CAMERA will automatically expose the film.
 - (e) Remove the CASSETTE and process the film.
- [7] Check the density of the film in the exposed area. If the density is too dark or too light, change the position of the INTENSITY SWITCH.
- [8] If the density is still not correct,
- (a) Remove the plastic CAP from the RHEOSTAT. See Figure 3.
 - (b) If the density of the exposed area is **too dark**, rotate the RHEOSTAT **clockwise** ↻.
 - (c) If the exposed area is **too light**, rotate the RHEOSTAT **counterclockwise** ↺.
 - (d) Install the plastic CAP on the RHEOSTAT.
- [9] Do Steps [6] - [8] again until the density of the exposed film is correct.

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SECTION 4 Operation

Recording a Patient's Data on X-ray Film

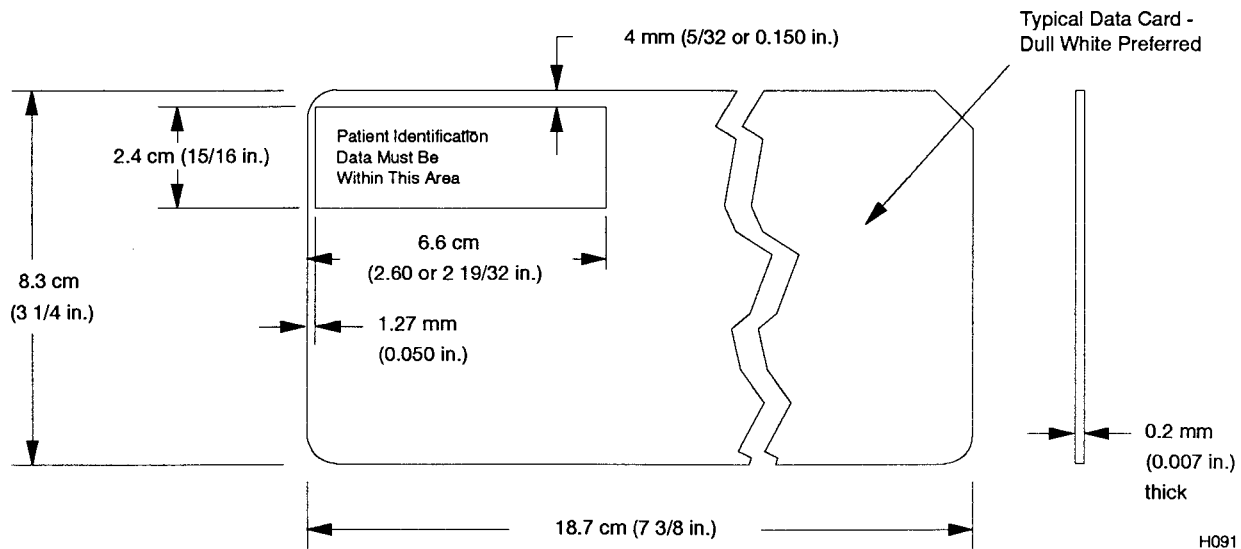
- [1] Prepare an IDENTIFICATION CARD for a CASSETTE with exposed but unprocessed x-ray film. See Figures 6 and 7 or the following list for the specifications of the IDENTIFICATION CARD.

- Minimum size: 7.5 X 7.5 cm (3 X 3 in.)
- Maximum size: 12.5 X 20.5 cm (5 X 8 in.)
- Maximum thickness: 0.3 mm (0.012 in.)
- Color: dull white cards with **black** ink

Standard white tab or data cards with rounded corners are ideal. The dimensions of these cards are 8.3 X 18.7 cm (3¼ X 7¾ in.).

NOTE

If the ink is not **black**, the density of the data on the film may not be correct.



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Figure 6 Patient's Identification Card for Model 2, 2-L, and 2-L60 Cameras

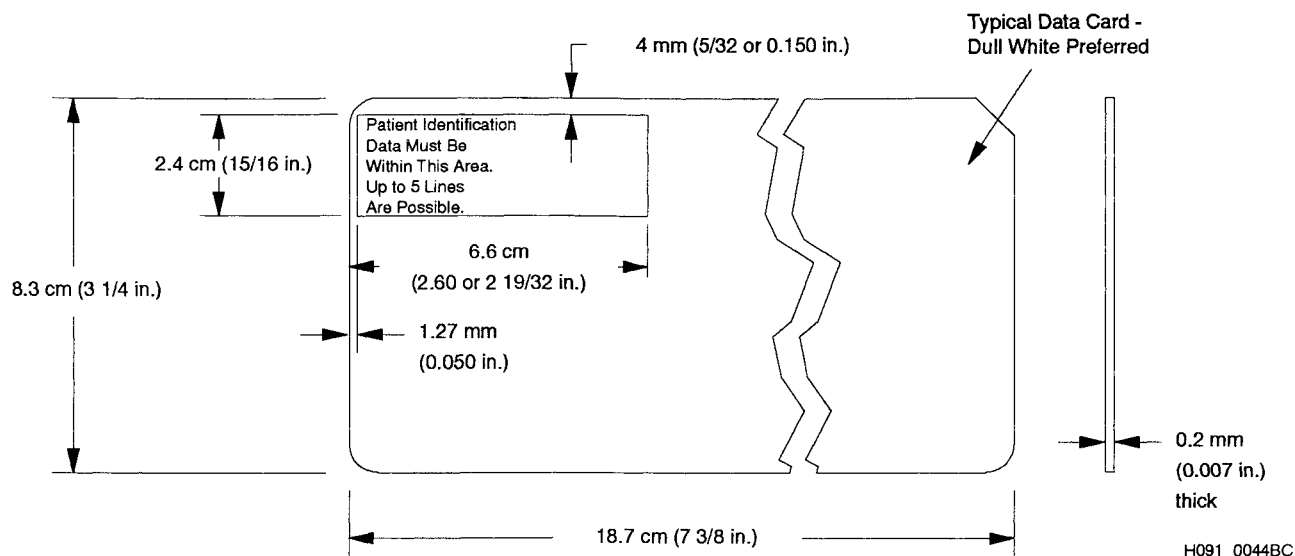


Figure 7 Patient's Identification Card for *Min-R* and *Min-R L* Cameras

- [2] Invert the IDENTIFICATION CARD and insert it under the CARD HOLDER. The data should now be under the bottom left corner of the CARD HOLDER.
- [3] Place a CASSETTE loaded with exposed film on the BASE with the WINDOW in the top left corner. Keep the left side of the CASSETTE flush with the thick section of the BASE.
- [4] Fully insert the CASSETTE into the SLOT above the BASE.

NOTE

When the CASSETTE is in the correct position, the CAMERA automatically exposes the film. You will see the illumination from the LAMP in the EXPOSURE INDICATOR. The entire exposure operation takes approximately 1 second.

IMPORTANT

Do not move the CASSETTE during the exposure.

- [5] Remove the CASSETTE from the CAMERA. The film is now ready to process.

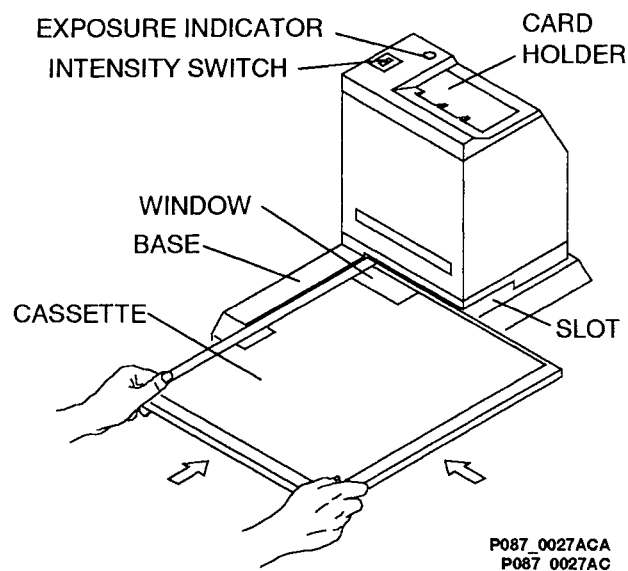


Figure 8 Card Holder

SECTION 5 Maintenance

Optics

Clean the top surface of the COVER GLASS at least once each week. Use *Kodak* LENS CLEANING PAPER or a soft, lint-free cloth.

Replacement of the Lamp

WARNING

Dangerous Voltage

- [1] Disconnect the main power.
- [2] Remove the existing LAMP.
- [3] Install a new LAMP 521417.
- [4] To adjust the new LAMP, see the "Adjustment of the Lamp" procedure on page 9-7.

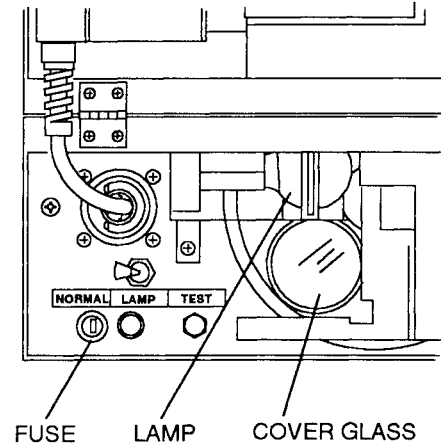


Figure 9 Optics, Lamp, and Fuse

Replacement of the Fuse

WARNING

Dangerous Voltage

- [1] Disconnect the main power.
- [2] Remove the existing FUSE.
- [3] Install a new FUSE with the correct specifications. See the table at the right.
- [4] If you must install a new FUSE often, check for correct operation and setup.

Model	Amperage	Input Voltage
2	2.5	120
2-L	1.6	200, 220, 240
2-L	2.5	120
2-L60	1.6	200, 220, 240
2-L60	2.5	120
Min-R	2.5	120
Min-R L	1.6	200, 220, 240
Min-R L	2.5	120

Battery

When "LOBAT" appears in the identification area on the x-ray film, you must install a new battery within 5 days. "LOBAT" will also be visible at the bottom of the CLOCK.

- [1] Remove the BATTERY LID.
- [2] Remove and correctly dispose of the existing battery.
- [3] Install a new 9-volt **alkaline** battery.
- [4] Close the BATTERY LID.
- [5] Press the R BUTTON and reset the CLOCK. See page 3-2.

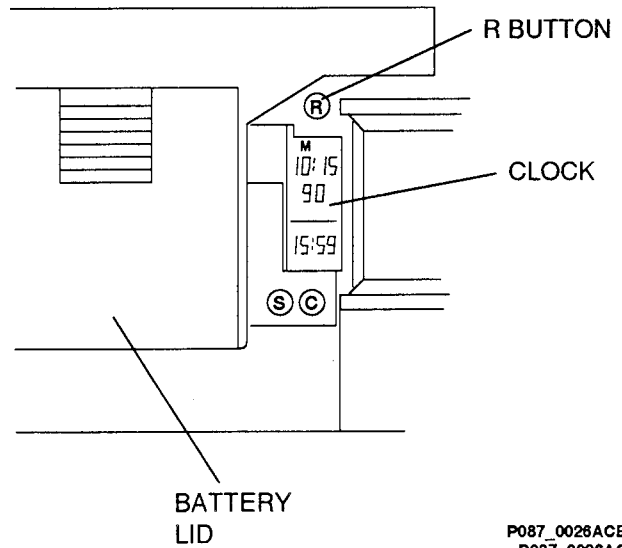


Figure 10 Clock Battery

SECTION 6

Theory of Operation

With the CAMERA connected to the main power, the CAMERA will function in the following way:

RELAY K1 is energized through SWITCHES S1 and either S2 or S6, all normally closed. RELAY K1 will then hold through its contacts K1-1 and K1-2 and through SWITCH S3, normally open. An exposure cycle is actuated by **correctly** inserting a CASSETTE into the SLOT above the BASE. The position of the CASSETTE controls and protects the internal mechanisms of the CAMERA.

NOTE

The LAMP SWITCH must be set to "NORMAL" for the exposure cycle to actuate.

When correctly inserted, the CASSETTE leaves SWITCH S1 inactive and actuates SWITCHES S2 and S6. With these 3 conditions met, power is applied to the EXPOSURE LAMP I1 and to RELAY K2 through a set of CONTACTS on RELAY K1. RELAY K2 then starts the MOTOR B1.


When the CARRIER ASSEMBLY starts to move, SWITCH S3 is released. This deenergizes RELAY K1, but maintains power to LAMP I1, RELAY K2, and the MOTOR. With RELAY K2 energized, CAPACITOR C1 charges to approximately 140 volts DC through RESISTOR R1 and DIODE CR1. When the CARRIER ASSEMBLY returns to home position, it will again actuate SWITCH S3. This operation removes power from RELAY K2 and from LAMP I1.

When RELAY K2 releases, CAPACITOR C1 discharges through the MOTOR. This acts as a brake on the MOTOR and prevents the CARRIER ASSEMBLY from coasting. You may now remove the CASSETTE from the CAMERA.

Removing the CASSETTE releases SWITCHES S2 and S6. This causes RELAY K1 to be energized through SWITCHES S1 and S2 (or S6). The CAMERA is now ready for another exposure.

SWITCH S1 is a safety device to protect the internal mechanisms of the CAMERA. If a CASSETTE is incorrectly inserted into the CAMERA, SWITCH S1 will activate and prevent the exposure cycle from starting.

SWITCH S4 is the LAMP SWITCH, used to test and calibrate the LAMP. In the "TEST" position, power goes directly to LAMP I1 and disables RELAY K2. SWITCH S4 must be on "NORMAL" to make an exposure.

RHEOSTAT R4 calibrates the CAMERA and LAMP combination. Rotating the RHEOSTAT counterclockwise  increases the intensity of the LAMP and the exposure. The INTENSITY SWITCH also adjusts the intensity of the LAMP, but in definite steps. With the INTENSITY SWITCH set to "HI", current flows through RESISTORS R4 and R5. When set to "MED", current flows through RESISTORS R2, R4, and R5. When set to "LO", current flows through RESISTORS R2, R3, R4, and R5.

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Diagrams

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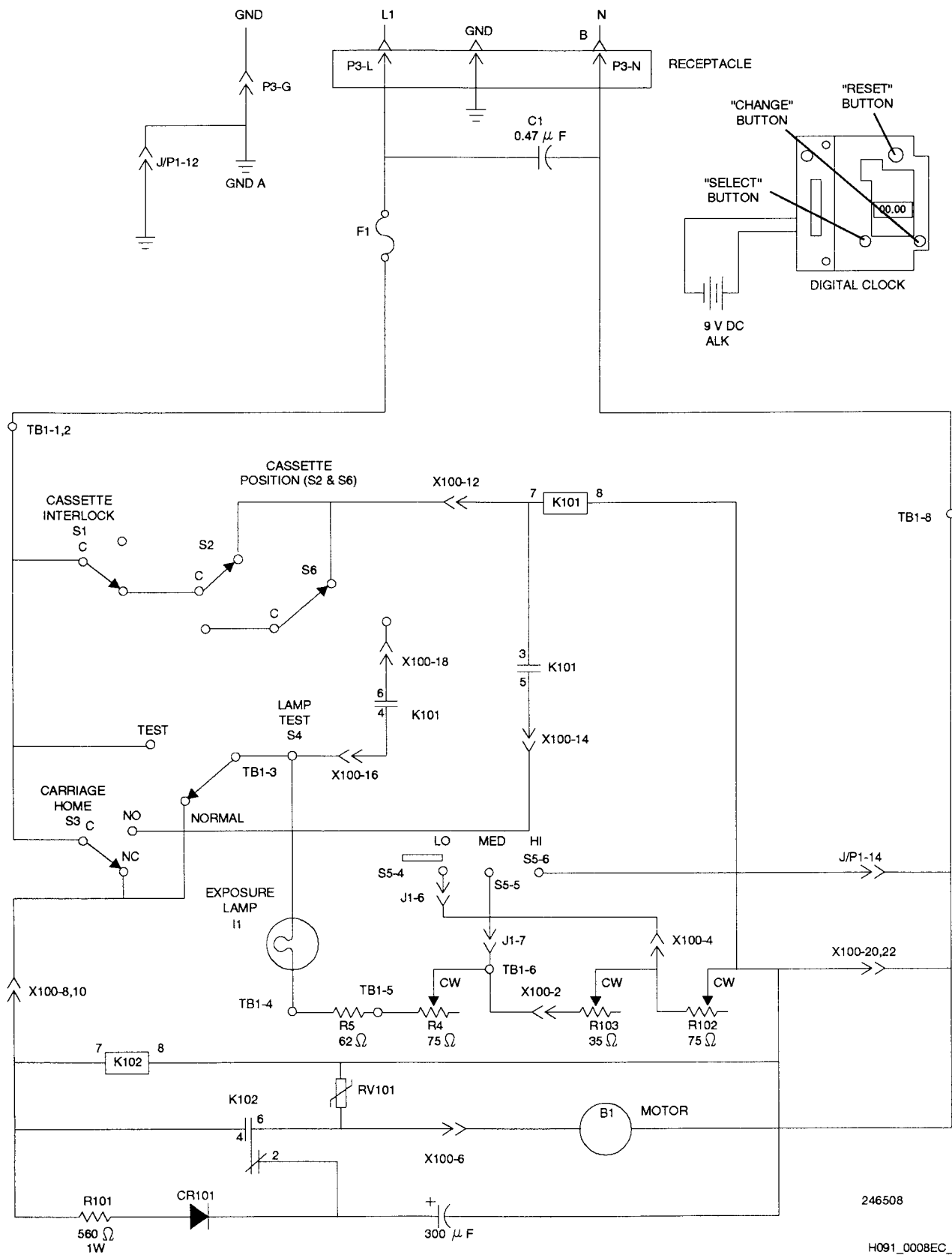


Figure 11 Circuit Diagram for the *Kodak X-Omatic* Identification Camera, Model 2 and the *Kodak Min-R* Identification Camera

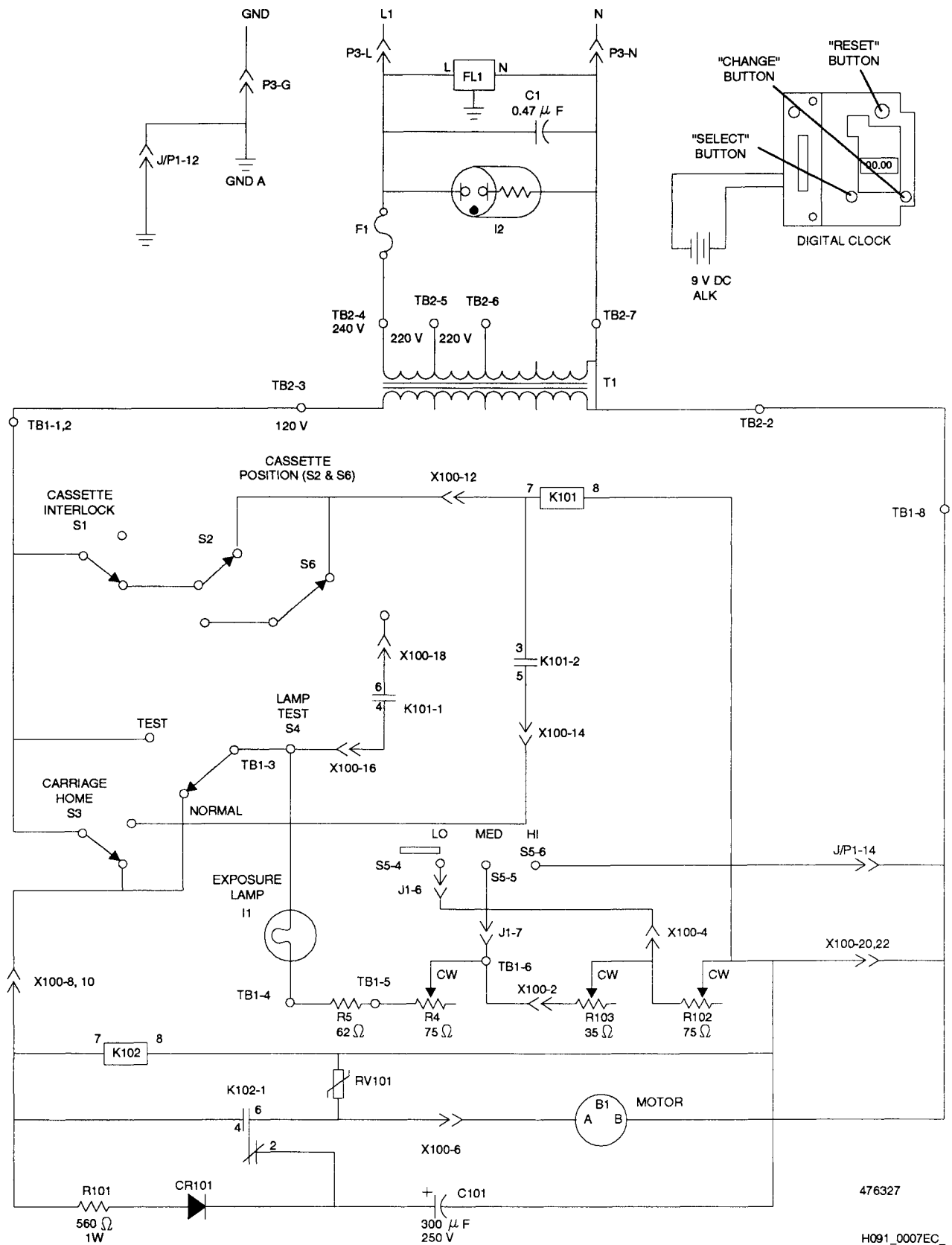
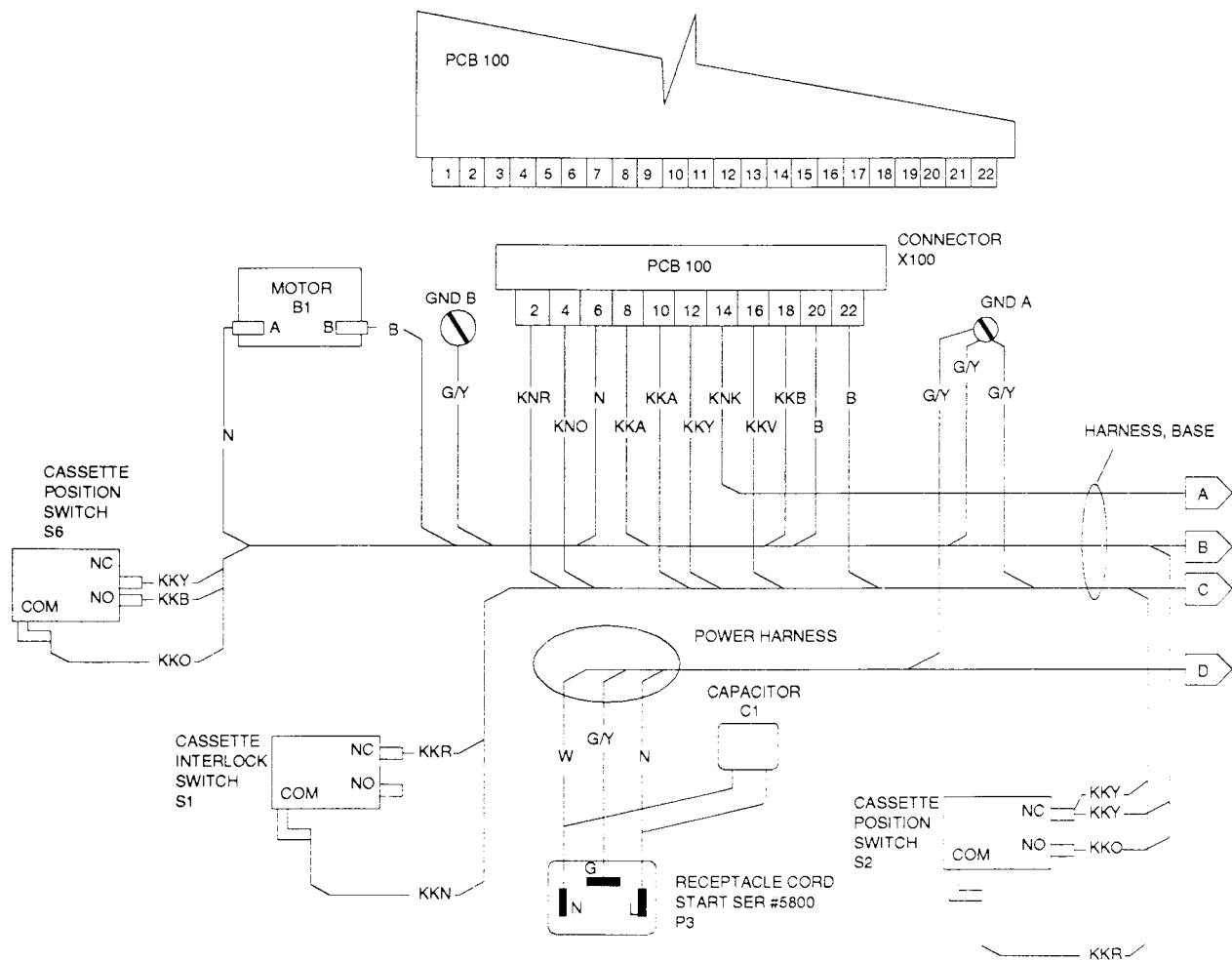


Figure 12 Circuit Diagram for the *Kodak X-Omatic* Identification Camera, Models 2-L and 2-L60 and the *Kodak Min-R L* Identification Camera

COLOR CODE			
K-BLACK	-0	G-GREEN	-5
N-BROWN	-1	B-BLUE	-6
R-RED	-2	V-VIOLET	-7
O-ORANGE	-3	A-GRAY	-8
Y-YELLOW	-4	W-WHITE	-9

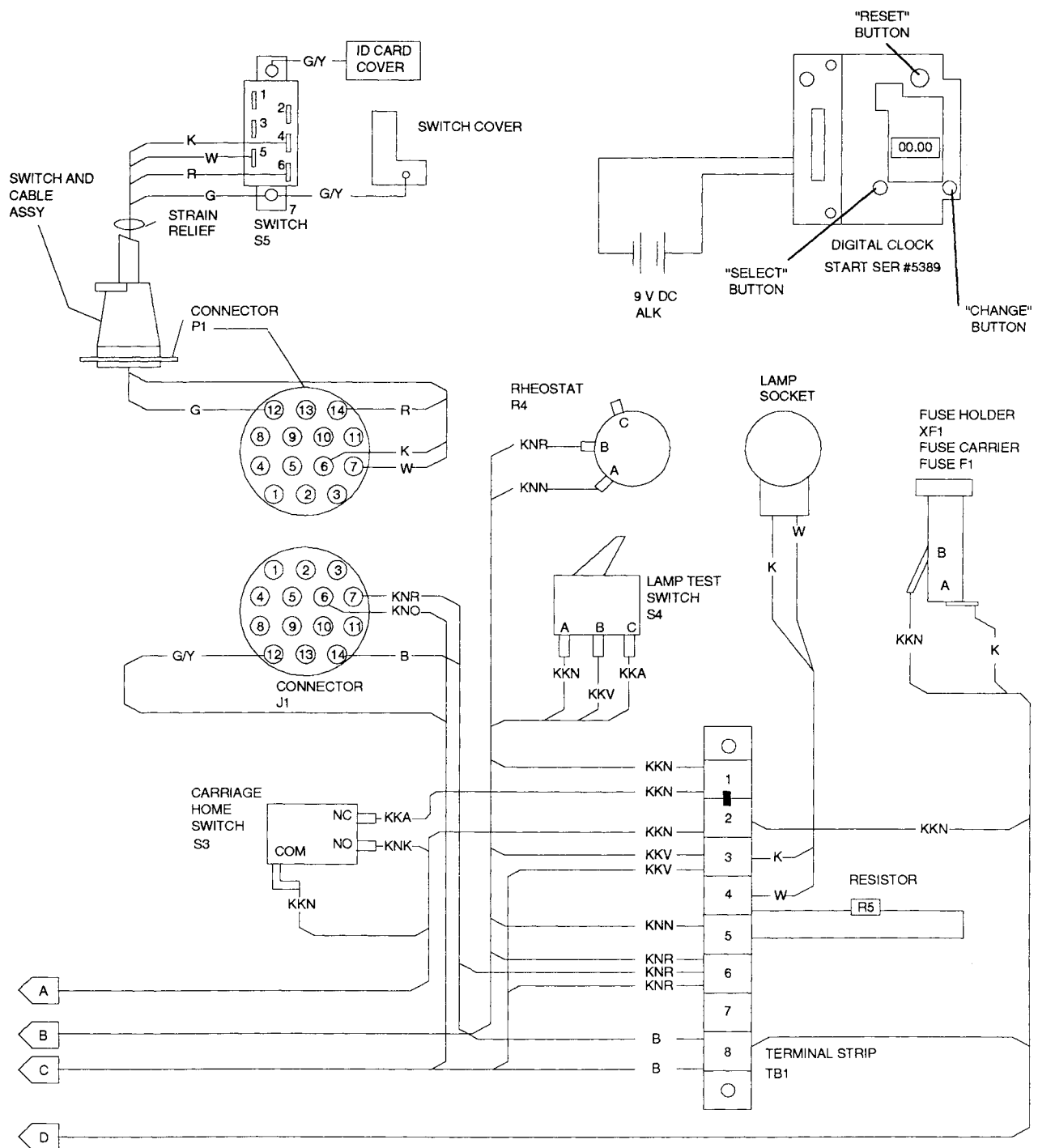
TO INTERPRET WIRE COLOR CODE, LOCATE EXTRA WIDE WHITE SPACE. ADJACENT NARROW COLOR BAND REPRESENTS FIRST (HUNDREDS) OF DIGIT IN CIRCUIT NUMBER. MEDIUM WIDTH BAND BECOMES (TENS) DIGIT, WIDEST BAND BECOMES THIRD (UNITS) DIGIT.



246510 sheet 1 of 2

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**Figure 13 Wiring Diagram, sheet 1 of 2 for the
Kodak X-Omatic Identification Camera, Model 2 and the Kodak
Min-R Identification Camera**



246510 sheet 2 of 2

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**Figure 14 Wiring Diagram, sheet 2 of 2 for the
Kodak X-Omatic Identification Camera, Model 2 and the Kodak
Min-R Identification Camera**

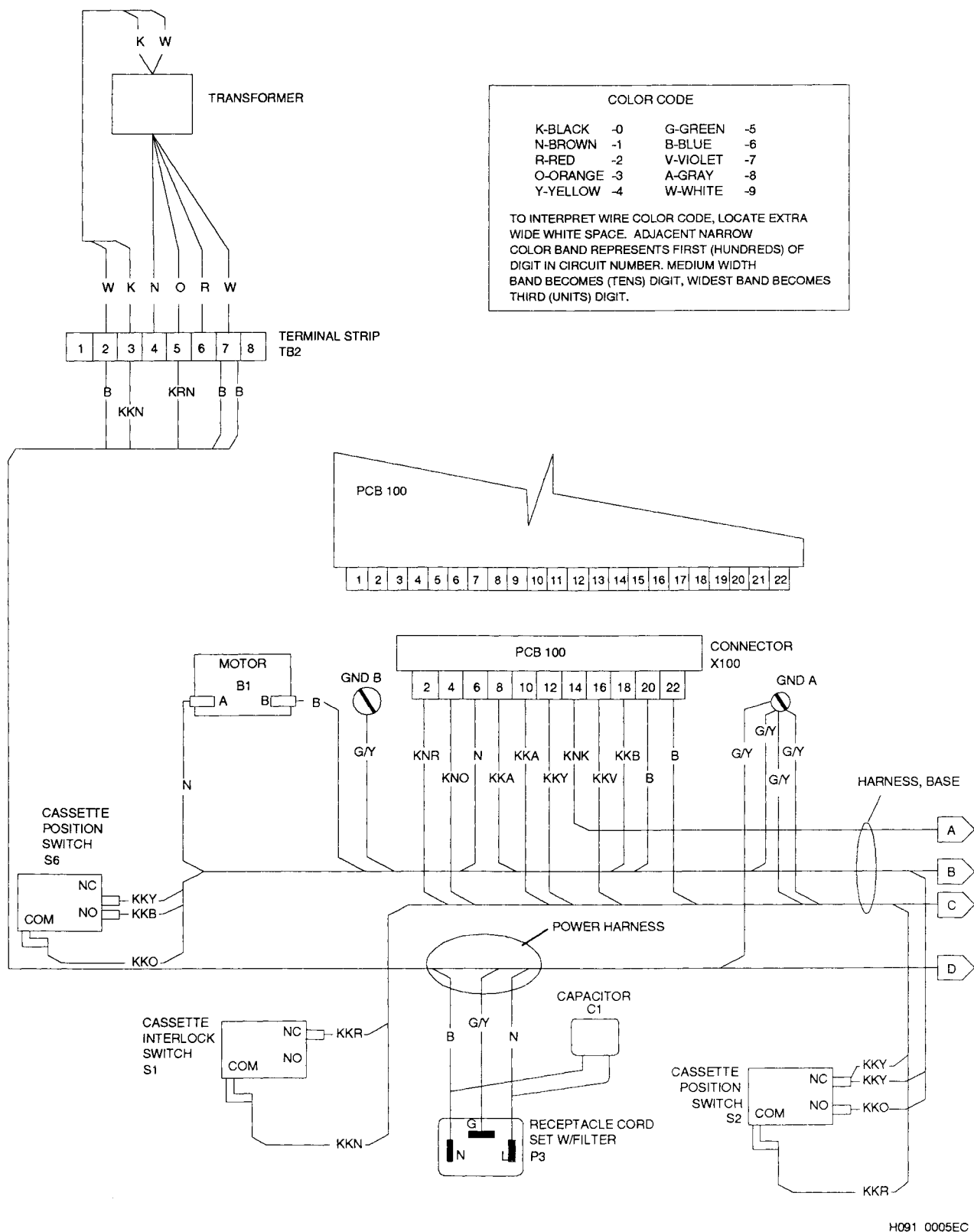
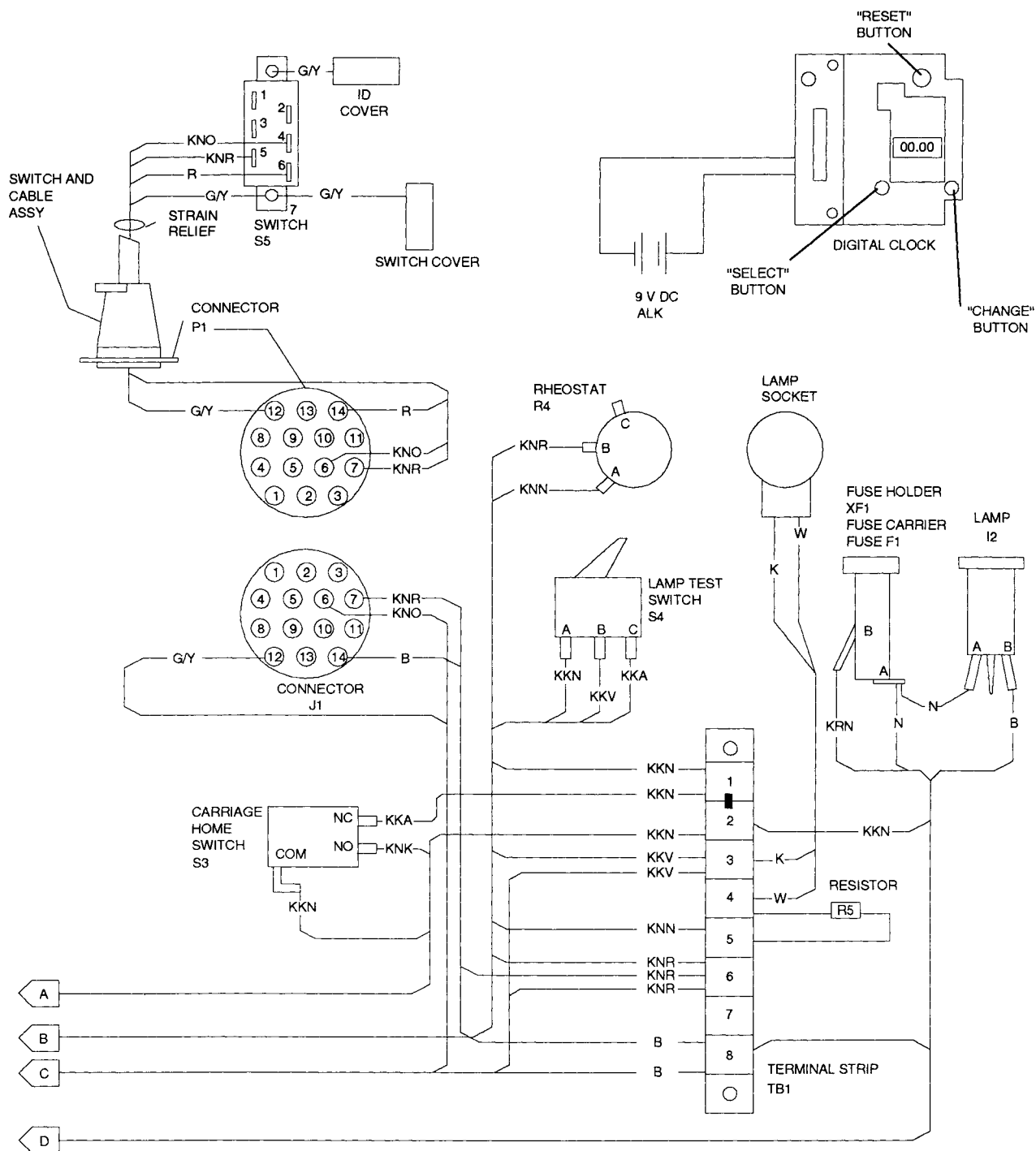


Figure 17 Wiring Diagram, sheet 1 of 2 for the
Kodak X-Omatic Identification Camera, Model 2-L60



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**Figure 18 Wiring Diagram, sheet 2 of 2 for the
Kodak X-Omatic Identification Camera, Model 2-L60**

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The Camera Does Not Operate with a Cassette Inserted

WARNING

Dangerous voltage. Disconnect the CAMERA from the main power before you do these procedures.

CAUSE	REMEDY
The CAMERA is not connected to the main power.	Check the plug for damage. Connect the CAMERA to a reliable power source.
The cassette is not inserted correctly.	Insert the cassette fully to the back of the CAMERA. The window must be up . The left side of the cassette must be flush with the thick section on the left side of the base.
The lamp switch S4 is set to "TEST".	Set the lamp switch to "NORMAL".
The fuse is burned out.	Install a new fuse. See page 5-1.
The cassette is damaged.	Load the film into a new cassette.
Correctly inserting a cassette into the CAMERA energizes the cassette interlock switch S1.	Do the "Adjustment of the Cassette Interlock Switch" procedure on page 9-3. If necessary, install a new switch.
Switch S6 is not adjusted correctly.	Do the "Adjustment of the Cassette Positioning Switch" procedure on page 9-2. If necessary, install a new switch.
The actuator for switch S2 does not move smoothly.	Clean the area around these parts.
Switch S2 is not adjusted correctly.	Do the "Adjustment of the Cassette Positioning Switch" procedure on page 9-2. If necessary, install a new switch.
The gears do not rotate.	Check the position of the e-rings on the shafts through the gears. The concave side of each e-ring must be toward the gear.
	The gear box is stripped. Install a new motor. See page 9-18.
The wires to the motor are not connected.	Connect the wires to the motor. See the Wiring Diagrams in Section 7.
The carriage home switch S3 does not actuate correctly.	Do the "Adjustment of the Carriage Home Switch" procedure on page 9-4. If necessary, install a new switch.
Relay K1 is not energized.	Install a new relay.

The Camera Operates Erratically or Does Not Open the Window in the Cassette

WARNING

Dangerous voltage. Disconnect the CAMERA from the main power before you do these procedures.

CAUSE	REMEDY
Correctly inserting a cassette into the CAMERA energizes the cassette interlock switch S1.	Do the "Adjustment of the Cassette Interlock Switch" procedure on page 9-3. If necessary, install a new switch.
Switch S6 is not adjusted correctly.	Do the "Adjustment of the Cassette Positioning Switch" procedure on page 9-2. If necessary, install a new switch.
The pin in the actuator assembly is not adjusted correctly.	Check the position of the pin in the actuator assembly. See page 9-5.
Switch S2 is not adjusted correctly.	Do the "Adjustment of the Cassette Positioning Switch" procedure on page 9-2. If necessary, install a new switch.
The carriage home switch S3 does not actuate correctly.	Do the "Adjustment of the Carriage Home Switch" procedure on page 9-4. If necessary, install a new switch.
The gears do not rotate.	Check the position of the e-rings on the shafts through the gears. The concave side of each e-ring must be toward the gear.
	The gear box is stripped. Install a new motor. See page 9-18.

Both the Camera and the Motor Operate, But No Exposure Is Made

WARNING

Dangerous voltage. Disconnect the CAMERA from the main power before you do these procedures.

CAUSE	REMEDY
The lamp is burned out.	Install a new lamp. If necessary, do the "Adjustment of the Lamp" procedure on page 9-7.
The cassette window does not open correctly.	When you insert the cassette, be sure to align it flush with the thick section of the base.
	The pin in the actuator assembly is not adjusted correctly. See the "Adjustment of the Actuator Assembly" procedure on page 9-5.
Rheostat R4 or resistor R5 is disconnected or burned out.	Make the correct connections. If necessary, install a new rheostat or resistor.
The wires to the lamp socket are disconnected.	Connect or install new wires.
The gears do not rotate.	Check the position of the e-rings on the shafts through the gears. The concave side of each e-ring must be toward the gear.
	The gear box is stripped. Install a new motor. See page 9-18.

The Exposure Across the Identification Area Is Not Uniform

WARNING

Dangerous voltage. Disconnect the CAMERA from the main power before you do these procedures.

CAUSE	REMEDY
The lens or the cover glass is dirty.	Clean the lens or the cover glass with <i>Kodak</i> LENS CLEANING PAPER.
The lamp is discolored.	Install a new lamp. If necessary, do the "Adjustment of the Lamp" procedure on page 9-7.
The integrator is not in the correct position.	(1) Loosen the screws on the integrator. (2) Set the lamp switch to "TEST". (3) Move the integrator until the slot is over the brightest part of the lamp. Check that the integrator is not touching the lamp. (4) Tighten the screws. (5) Set the lamp switch to "NORMAL".
The hinges on the cover are loose.	Apply ADHESIVE TL-2390 to each screw. Tighten the screws.

The Image on the Film Is Too Dark or Too Light

WARNING

Dangerous voltage. Disconnect the CAMERA from the main power before you do these procedures.

CAUSE	REMEDY
The lens or the cover glass is dirty.	Clean the lens or the cover glass with <i>Kodak</i> LENS CLEANING PAPER.
The intensity switch is not set to the correct position.	Set the intensity switch to another position.
Rheostat R4 is not set to the correct position.	Adjust the rheostat until the exposure is correct. Rotate the rheostat clockwise ↻ to make a lighter exposure. Rotate the rheostat counterclockwise ↻ to make a darker exposure.

The Image on the Film Is Foggy, Distorted, Blank, Partially Missing, or Not Correctly Aligned

WARNING

Dangerous voltage. Disconnect the CAMERA from the main power before you do these procedures.

CAUSE	REMEDY
The cassette moved during the exposure.	Do not move the cassette during the exposure.
The identification card was not correctly inserted under the card holder.	Insert the identification card with the printed data inverted in the bottom left corner.
The hinges on the cover are loose or are not aligned correctly.	Tighten the hinges, and make a test exposure. If necessary, loosen the screws to the hinges and align the hinges correctly.
The cover glass is dirty.	Clean the cover glass with <i>Kodak</i> LENS CLEANING PAPER.
The cable is in the path of the exposure.	Move the cable from the path of the exposure.

The Camera Makes an Exposure, But Does Not Record the Correct Time on the Film

WARNING

Dangerous voltage. Disconnect the CAMERA from the main power before you do these procedures.

CAUSE	REMEDY
The clock does not have power.	(1) Check that all the wires to the clock are correctly connected. (2) Install a new battery. (3) If necessary, install a new clock. See page 9-9.
The clock is not set to the correct time.	Set the clock to the correct time. See page 3-2.

The Motor Continues to Operate Either Intermittently or Continually After the Exposure Is Complete

This may cause any of the following problems:

- The cassette may bind when you remove it from the CAMERA.
- The window of the cassette may have abrasions.
- The window of the cassette may remain partially open after you remove the cassette.

WARNING

Dangerous voltage. Disconnect the CAMERA from the main power before you do these procedures.

CAUSE	REMEDY
The carriage home switch S3 does not actuate correctly.	Do the "Adjustment of the Carriage Home Switch" procedure on page 9-4. If necessary, install a new switch.
Relay K1 or K2 does not energize.	<ol style="list-style-type: none"> (1) Check the connections between the relays and the circuit board. (2) If necessary, resolder the connections or install new relays.
The wires that hold capacitor C1 to the circuit board have a cold solder joint.	<ol style="list-style-type: none"> (1) Before you touch the circuit board, discharge the capacitor to ground. <ul style="list-style-type: none"> • Hold one end of a wire or metal tool to the capacitor lead on the circuit board. • Touch the ground lug on the inner housing with the other end of the wire or the tool. (2) Resolder the connection between the capacitor and the circuit board. (3) If necessary, install a new capacitor.
The articulating arm or the gears are loose.	<ol style="list-style-type: none"> (1) Check that the articulating arm and the gears are connected correctly. See the section that starts on page 9-18. <p style="text-align: center;">NOTE</p> <p>If you move the actuator arm with the main power connected, the carrier assembly will move through a full cycle.</p> <ol style="list-style-type: none"> (2) If necessary, install a new articulating arm or new gears.
The rods are not dry.	Remove all lubrication from the rods.

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SECTION 9

Adjustments and Replacements

Special Tools

TL-1016 Retaining Ring Pliers

TL-2583 Extraction Tool (Amp, Inc, No. 91017-3)

TL-2390 Adhesive

CAUTION

Do not use magnetic tools.

General Access Procedure

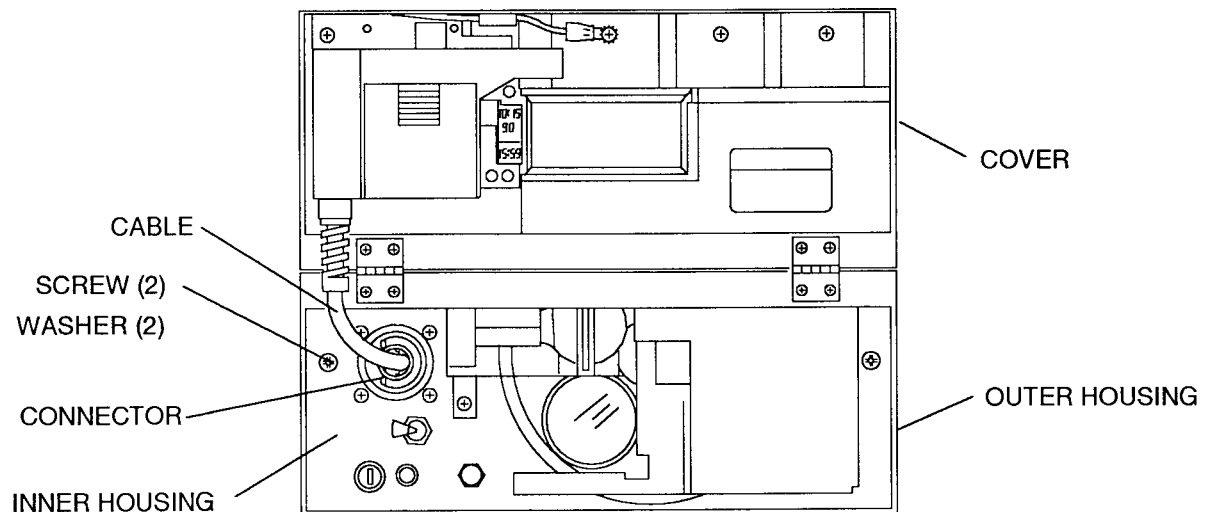
Do the following steps to deenergize the CAMERA and to remove the OUTER HOUSING. This will allow you to adjust or install new components inside the CAMERA. If it is necessary to disconnect any

wires during a service procedure, record the colors and locations of the wires **before** you disconnect them.

WARNING

Dangerous Voltage

- [1] Disconnect the main power.
- [2] Open the COVER on the top of the CAMERA.
- [3] Remove the 2 SCREWS and the 2 WASHERS that hold the OUTER HOUSING to the INNER HOUSING.
- [4] Disconnect the CABLE and CONNECTOR from the INNER HOUSING.
- [5] Lift the OUTER HOUSING from the CAMERA.



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Figure 19 For Access to the Inside of the Camera

Adjustment of the Cassette Positioning Switch S2 or S6

- [1] Do the "General Access Procedure" on page 9-1.
- [2] Fully insert a CASSETTE into the SLOT above the BASE.

IMPORTANT

The CASSETTE must remain fully inserted.

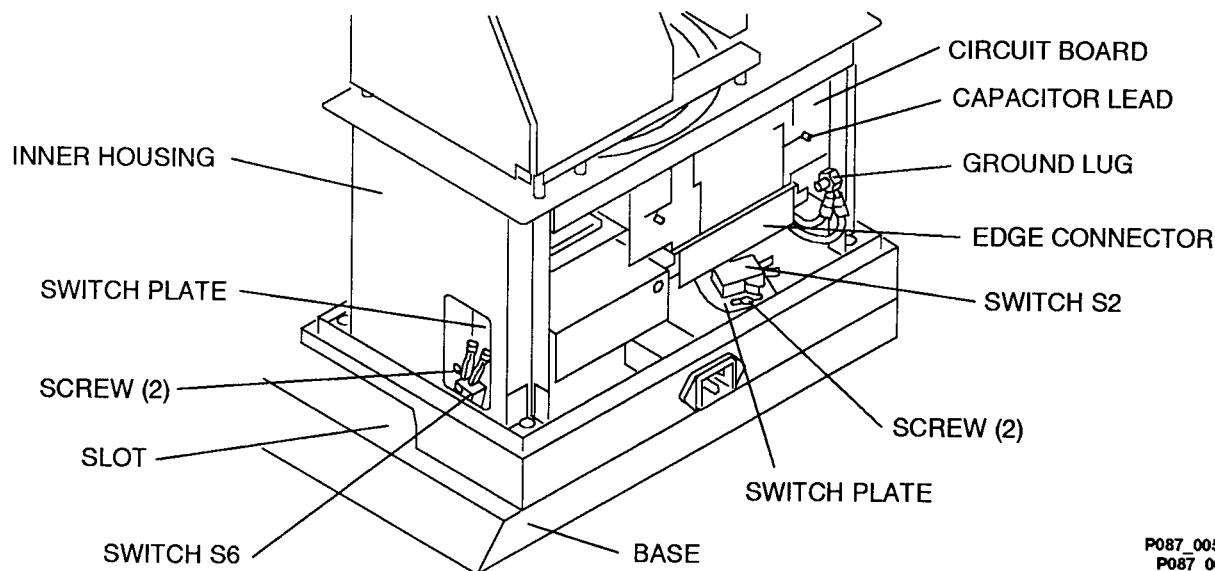
If you want to adjust SWITCH S6 only, advance to Step [5]. If you want to adjust SWITCH S2, continue with Step [3].

WARNING

Dangerous voltage. Before you touch the CIRCUIT BOARD, discharge the CAPACITOR to ground.

- [3] Use a wire or metal tool to discharge the CAPACITOR.
 - (a) Hold one end of the wire or tool to the CAPACITOR LEAD on the CIRCUIT BOARD.
 - (b) Touch the GROUND LUG on the INNER HOUSING with the other end of the wire or the tool.

- [4] For easier access to SWITCH S2, disconnect the EDGE CONNECTOR from the CIRCUIT BOARD.
- [5] To adjust SWITCH S2 or S6, loosen the 2 SCREWS and move the SWITCH PLATE for that SWITCH away from the CASSETTE as far as possible.
- [6] Slowly move the SWITCH PLATE toward the CASSETTE until you hear a click.
- [7] Tighten the 2 SCREWS.
- [8] Remove the CASSETTE. You will hear another click.
- [9] If you removed the EDGE CONNECTOR in Step [4], connect it again to the CIRCUIT BOARD.
- [10] To assemble the CAMERA, reverse the "General Access Procedure" on page 9-1.



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Figure 20 Adjustment of the Cassette Positioning Switches S2 and S6

Adjustment of the Cassette Interlock Switch S1

- [1] Do the "General Access Procedure" on page 9-1.
- [2] For easier access to SWITCH S1, remove the 2 SCREWS and release the RECEPTACLE.
- [3] Loosen the 2 SWITCH SCREWS and press SWITCH S1 fully toward the front of the CAMERA.
- [4] Fully insert a CASSETTE into the SLOT above the BASE.
- [5] Slowly move the SWITCH toward the back of the CAMERA until you hear a click.
- [6] Tighten the 2 SWITCH SCREWS.
- [7] Remove the CASSETTE.
- [8] Make a test exposure to check that the SWITCH operates correctly.
- [9] Install the RECEPTACLE and 2 SCREWS.
- [10] To assemble the CAMERA, reverse the "General Access Procedure" on page 9-1.

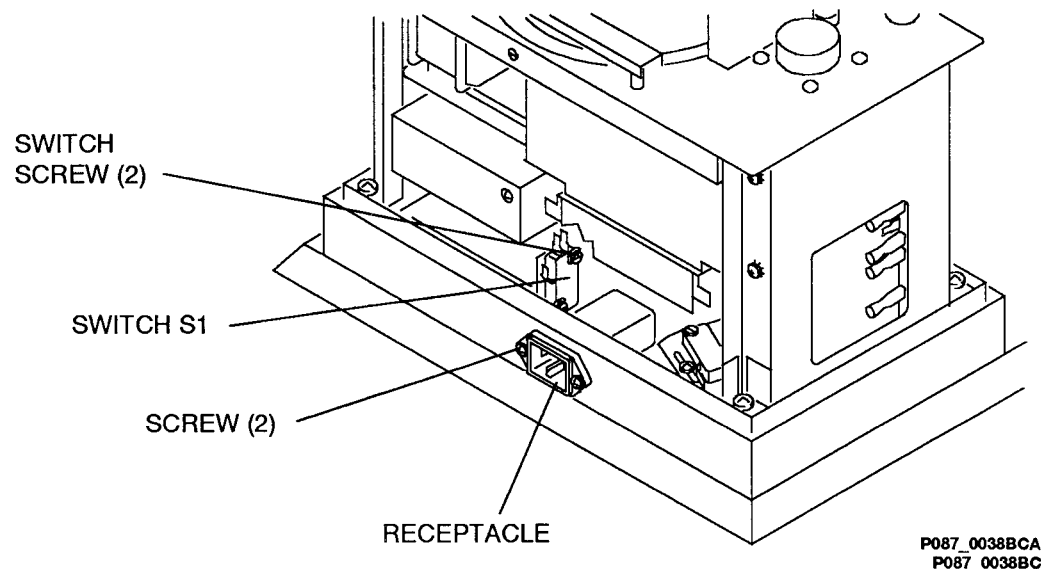


Figure 21 Adjustment of the Cassette Interlock Switch S1

Adjustment of the Carriage Home Switch S3

WARNING

Moving parts. If you do not disconnect the main power, the CARRIER ASSEMBLY will move when you adjust the CARRIAGE HOME SWITCH.

- [1] Do the "General Access Procedure" on page 9-1.
- [2] Move the CARRIER ASSEMBLY fully to the left.
- [3] Loosen the 2 SCREWS.
- [4] Lift the CARRIAGE HOME SWITCH S3 fully up.
- [5] Slowly move the SWITCH down and to the right until it actuates when it has moved 2/3 of the way up the CARRIER RAMP. You will hear a sound.
- [6] Tighten the 2 SCREWS.
- [7] To assemble the CAMERA, reverse the "General Access Procedure" on page 9-1.

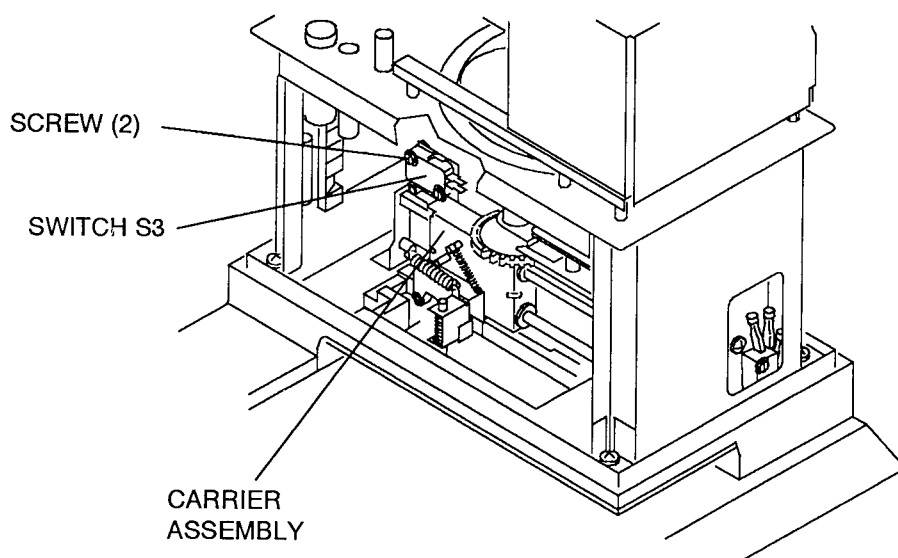
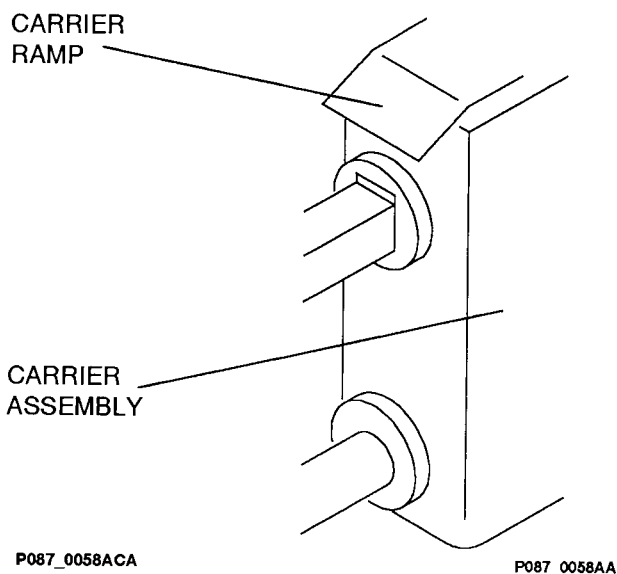


Figure 22 Adjustment of the Carriage Home Switch S3

Adjustment of the Actuator Assembly

To Adjust the Position of the Pin

- [1] Do the "General Access Procedure" on page 9-1.
- [2] Release the ACTUATOR SPRING.
- [3] Move the CARRIER ASSEMBLY to the left and right until the PIN touches the slot on the WINDOW in the CASSETTE.
- [4] Check that the PIN is in the center of the slot from front to back.

- (a) If the PIN is not in the center of the slot, remove the E-RING.

CAUTION

One SHIM must remain between the E-RING and the ACTUATOR ASSEMBLY.

- (b) Adjust the number of SHIMS on either side of the ACTUATOR ASSEMBLY until the PIN is in the center.

- (c) Install the E-RING.

- [5] Check that the PIN presses the latch and opens the WINDOW.

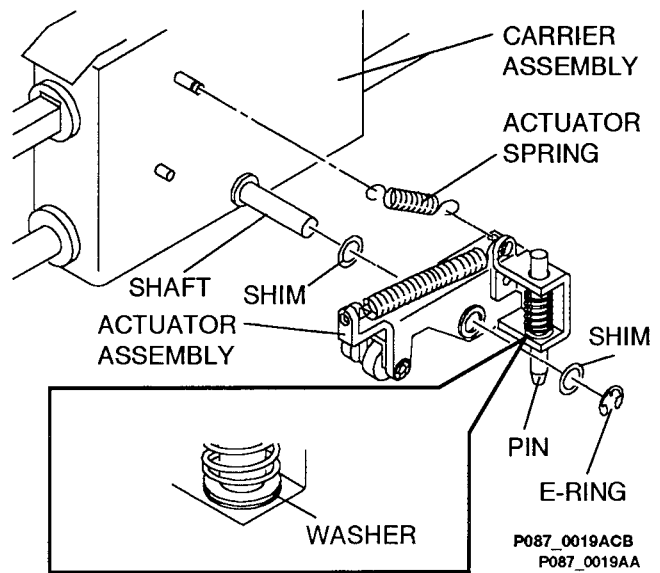
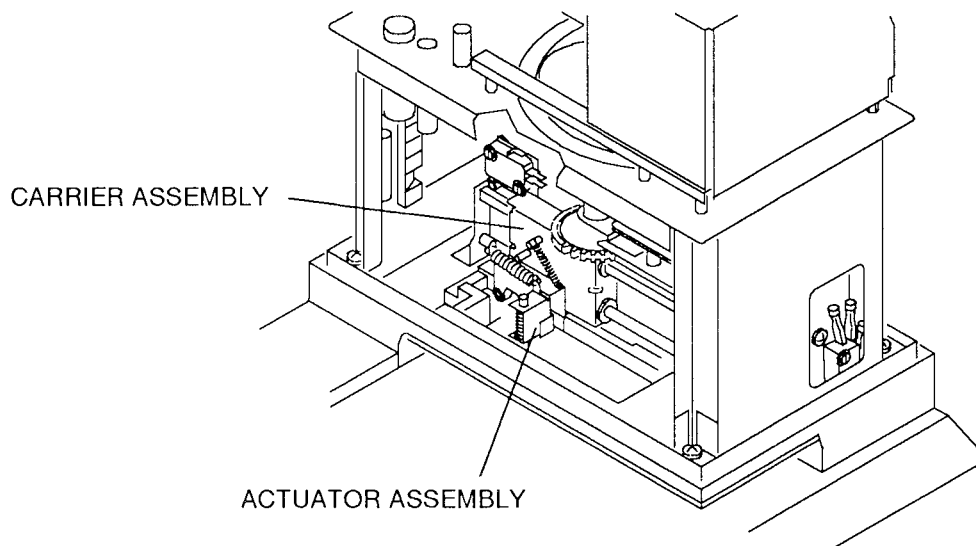


Figure 23 Adjustment of the Pin on the Actuator Assembly

NOTE

A PIN ADJUSTMENT TOOL, Part No. 1C0071, is available for adjusting the position of the PIN. Instructions for use are included with the tool.



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CAUTION

Do not remove all WASHERS. One WASHER must remain.

- [6] To adjust the height of the PIN, use diagonal cutters to remove a WASHER. Continue to remove WASHERS until the WINDOW opens.
- [7] Install the ACTUATOR SPRING.

NOTE

- Check that the E-RING seats in the groove of the SHAFT.
 - Check that the ACTUATOR SPRING is installed **through the hole** in the ACTUATOR ASSEMBLY.
- [8] To assemble the CAMERA, reverse the "General Access Procedure" on page 9-1.

To Correct Overtravel of the Actuator Assembly

- [1] Do the "General Access Procedure" on page 9-1.
- [2] Check and adjust the CARRIAGE HOME SWITCH S3. See page 9-4.

WARNING

Dangerous voltage.

- [3] If Step [2] does not correct the overtravel, discharge CAPACITOR C1.
 - (a) Hold one end of a wire or metal tool to the CAPACITOR LEAD on the CIRCUIT BOARD.
 - (b) Touch the GROUND LUG on the INNER HOUSING with the other end of the wire or tool.
- [4] Add solder to the 2 CAPACITOR LEADS on the back of the CIRCUIT BOARD.
- [5] If the problem still occurs, install a new CIRCUIT BOARD.
- [6] To assemble the CAMERA, reverse the "General Access Procedure" on page 9-1.

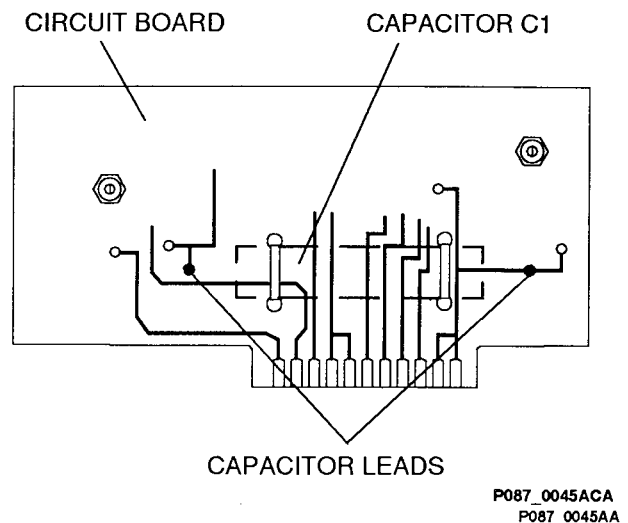


Figure 24 Leads on the Circuit Board for Capacitor C1

Adjustment of the Lamp

Purpose: To obtain **uniform** density across the exposure

- [1] Do the "General Access Procedure" on page 9-1.
- [2] Loosen the 2 SCREWS.
- [3] Connect the CAMERA to a power source.
- [4] Set the LAMP SWITCH to "TEST".
- [5] Adjust the INTEGRATOR until the SLOT is centered over the brightest part of the LAMP.

CAUTION

Check that the INTEGRATOR is not touching the LAMP.

- [6] Tighten the 2 SCREWS.
- [7] Set the LAMP SWITCH to "NORMAL".
- [8] To assemble the CAMERA, reverse the "General Access Procedure" on page 9-1.
- [9] Make a test exposure on film. The density should be uniform across the exposed area of the film. If the density is not uniform, do this procedure again until the density is uniform.

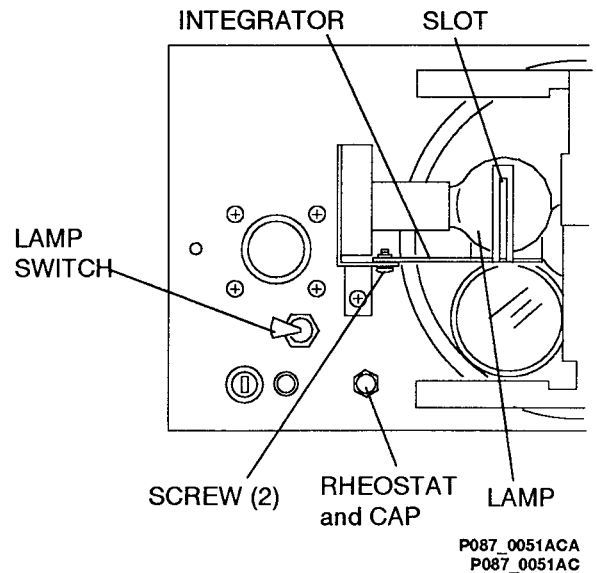


Figure 25 Adjusting the Lamp for Uniform Exposure Density

Purpose: To adjust the **overall** density of the exposure

WARNING

Dangerous Voltage

- [1] Set the INTENSITY SWITCH on the COVER to another position, and make a test exposure on film. See page 3-3.
- [2] If none of the 3 positions provides the correct density, continue with Step [3].
- [3] Open the COVER on the top of the CAMERA.
- [4] Remove the plastic CAP and adjust the RHEOSTAT.

(a) Rotate the RHEOSTAT **clockwise** ↻ to make **lighter** exposures.

(b) Rotate the RHEOSTAT **counterclockwise** ↺ to make **darker** exposures.

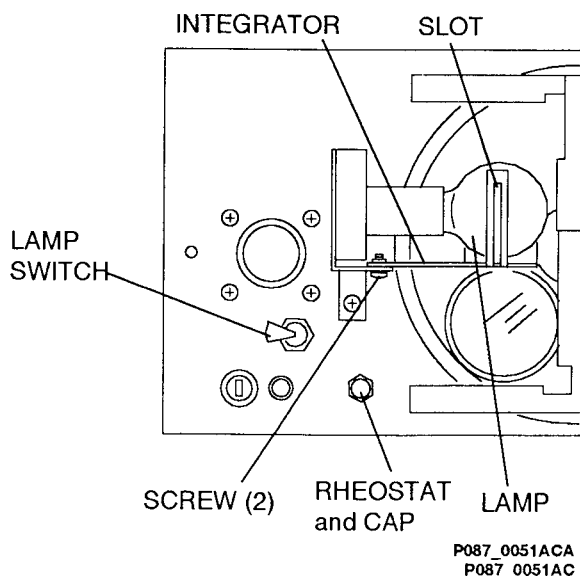
[5] Close the COVER.

[6] Make a test exposure on film. Do Steps [3] - [5] again if necessary.

[7] Install the CAP.

NOTE

The intensity of each LAMP is different.

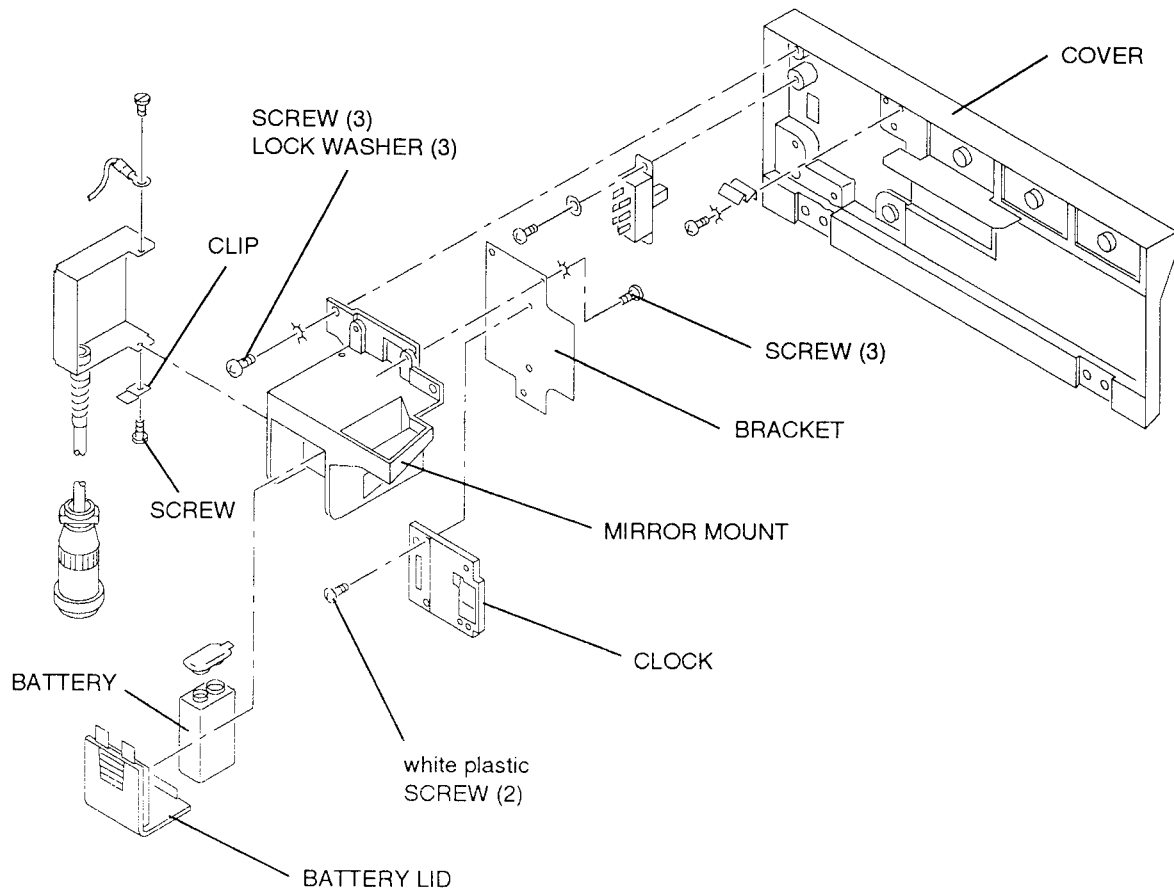


Replacement of the Clock

WARNING

Dangerous Voltage

- [1] Disconnect the main power.
- [2] Open the COVER on the top of the CAMERA.
- [3] Loosen the SCREW and the CLIP.
- [4] Open the BATTERY LID and remove the BATTERY.
- [5] Remove and keep the 3 SCREWS and 3 LOCK WASHERS that hold the MIRROR MOUNT in position. Lift the MIRROR MOUNT.
- [6] Remove and keep the 3 SCREWS from the BRACKET on the bottom of the MIRROR MOUNT.
- [7] Remove and keep the 2 white plastic SCREWS from the top of the CLOCK. Continue with Step [8].



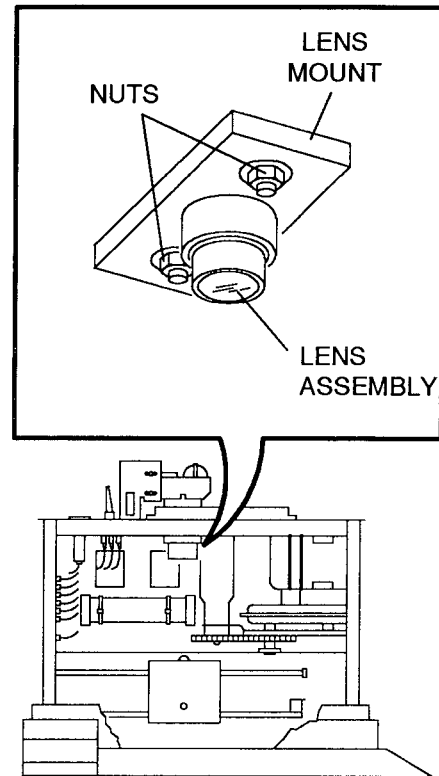
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Figure 26 Replacement of the Clock

- [8] Remove and discard the CLOCK.
- [9] Install the new CLOCK on the MIRROR MOUNT. Use the 5 SCREWS from Steps [6] and [7].
- [10] Install the MIRROR MOUNT on the COVER. Use the 3 SCREWS from Step [5].
- [11] Install the BATTERY and the BATTERY LID.
- [12] Tighten the SCREW and CLIP.
- [13] Set the CLOCK. See page 3-2.
- [14] Check the position of the image.
 - (a) Expose a test exposure.
 - (b) Check that all the patient's information is on the film.
 - (1) If not, loosen the 4 SCREWS that hold the COVER on the CAMERA.
 - (2) Move the COVER from side to side and from front to back.
 - (3) Tighten the 4 SCREWS.
 - (4) Make another test exposure and check the position of the patient's information.
 - (5) If the position is still not correct, do the adjustment of the LENS ASSEMBLY. See page 9-11.

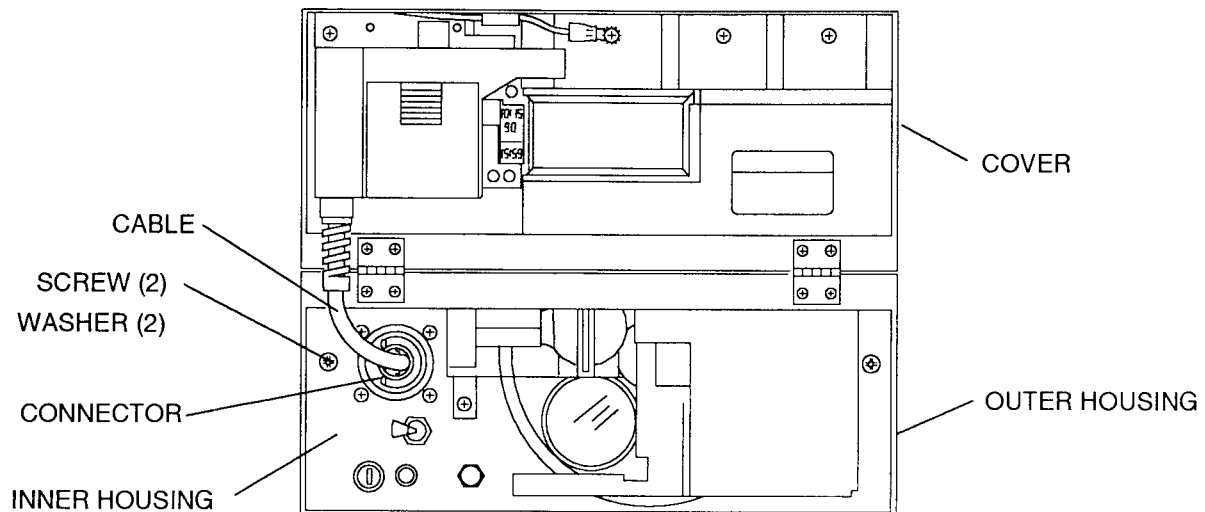
Adjustment of the Lens Assembly

- [1] Disconnect the main power and the CABLE.
- [2] With the COVER in the best position, tighten the 4 SCREWS.
- [3] Remove the 2 SCREWS that hold the OUTER HOUSING.
- [4] Remove the OUTER HOUSING from the CAMERA.
- [5] Loosen the 2 NUTS that hold the LENS ASSEMBLY.
- [6] Move the LENS ASSEMBLY a small distance.
- [7] Tighten the 2 NUTS.
- [8] Install the OUTER HOUSING and the 2 SCREWS.
- [9] Connect the CABLE and the main power.
- [10] Make a test exposure.
- [11] Do the adjustment again, if necessary for correct position of the patient's information.



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Figure 27 Adjustment of the Lens Assembly



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Replacement of the Intensity Switch

WARNING

Dangerous Voltage

- [1] Disconnect the main power.
- [2] Open the COVER on the top of the CAMERA.
- [3] Remove the 3 SCREWS, the 3 LOCK WASHERS, and the ground wire from the MIRROR MOUNT.
- [4] Lift the MIRROR MOUNT from the COVER.
- [5] Record the color and position of the wires connected to the INTENSITY SWITCH.
- [6] Remove the wires from the INTENSITY SWITCH.
- [7] Remove the 2 SCREWS and 2 WASHERS from the INTENSITY SWITCH.
- [8] Remove and discard the existing INTENSITY SWITCH.

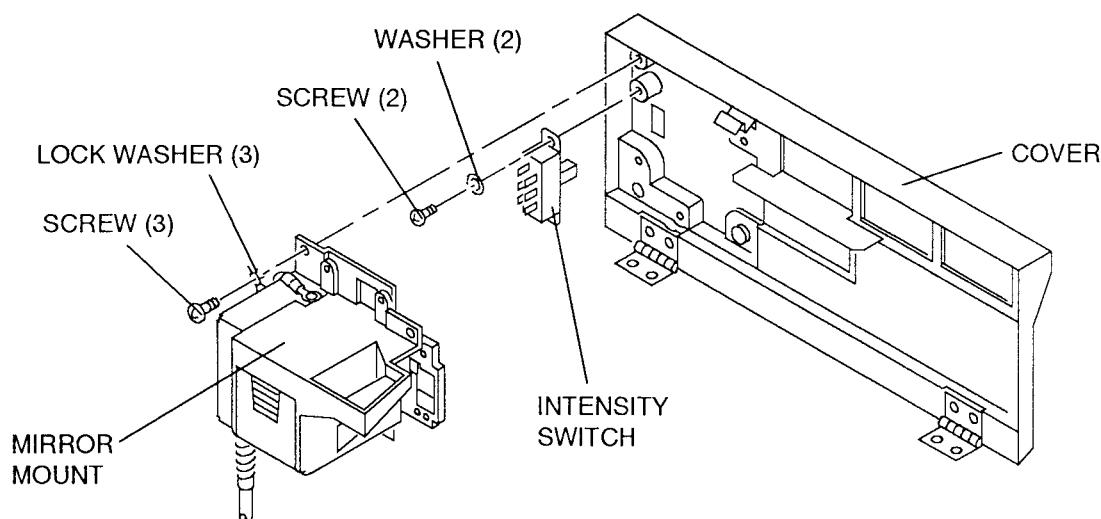
- [9] Install the new INTENSITY SWITCH.

IMPORTANT

Install the INTENSITY SWITCH so that the side with the little hole is toward the outside of the CAMERA.

Otherwise, you will not be able to move the INTENSITY SWITCH from "LO" to "MED" to "HI".

- [10] Solder the wires to the INTENSITY SWITCH in the same locations as recorded in Step [5].
- [11] Install the MIRROR MOUNT, the ground wire, and all the SCREWS.



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P087_0056BC

Figure 28 Replacement of the Intensity Switch

Replacement of the Cassette Interlock Switch S1

- [1] Do the "General Access Procedure" on page 9-1.
- [2] Remove and keep the 2 SCREWS from the RECEPTACLE. Loosen the RECEPTACLE from the CAMERA to provide easier access to the CASSETTE INTERLOCK SWITCH.
- [3] Remove and keep the 2 SWITCH SCREWS, the 2 LOCK WASHERS, the 2 WASHERS, and the NUT PLATE.
- [4] Remove the CASSETTE INTERLOCK SWITCH from the SWITCH BRACKET.
- [5] Disconnect the 2 wires on the existing CASSETTE INTERLOCK SWITCH. Connect them to the corresponding parts of the new SWITCH.
- [6] Discard the existing CASSETTE INTERLOCK SWITCH.
- [7] Connect the new CASSETTE INTERLOCK SWITCH to the SWITCH BRACKET. Use the 2 SWITCH SCREWS, the 2 LOCK WASHERS, the 2 WASHERS, and the NUT PLATE removed in Step [3].
- [8] Do the "Adjustment of the Cassette Interlock Switch S1" procedure on page 9-3.
- [9] Press the RECEPTACLE into the CAMERA and install the 2 SCREWS removed in Step [2].
- [10] To assemble the CAMERA, reverse the "General Access Procedure" on page 9-1.

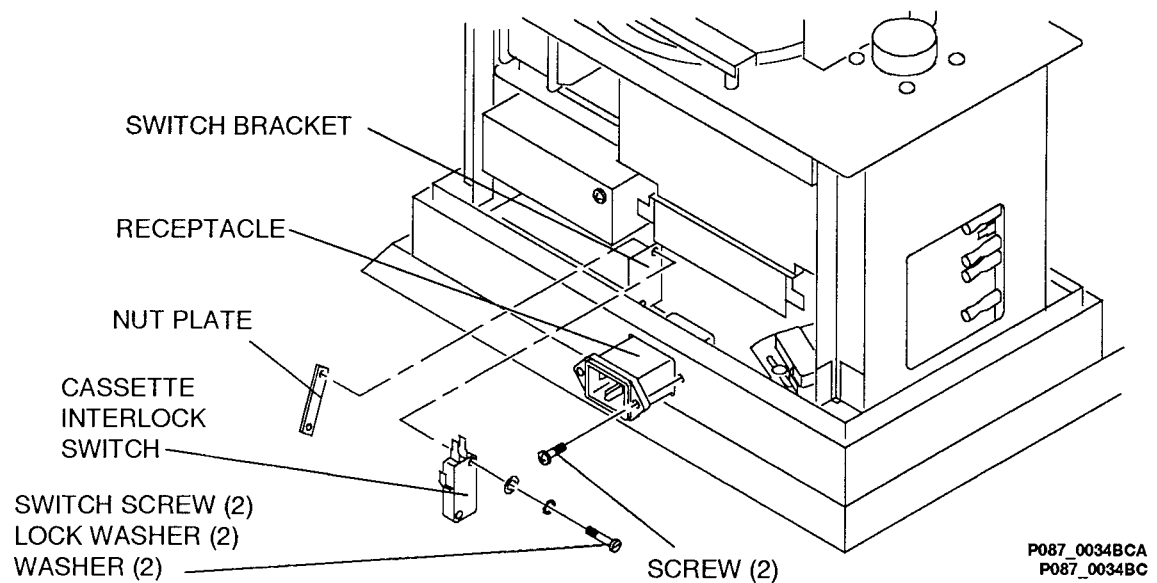


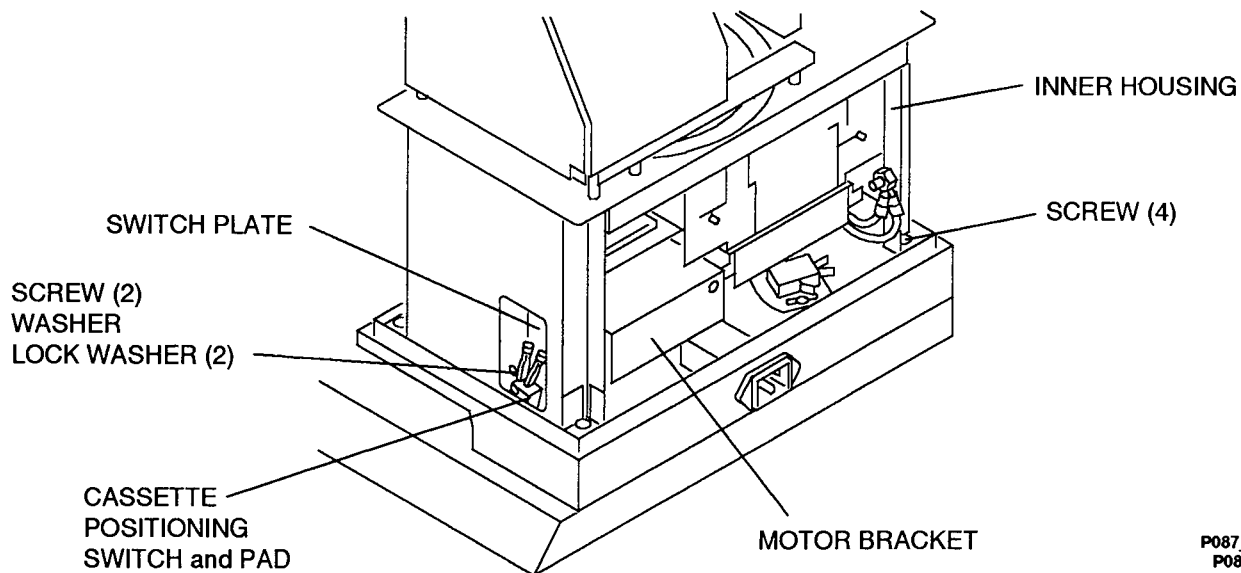
Figure 29 Replacement of the Cassette Interlock Switch S1

Replacement of the Cassette Positioning Switch S6

- [1] Do the "General Access Procedure" on page 9-1.
 - [2] Record which SCREW has the WASHER.
 - [3] Remove and keep the 2 SCREWS, the WASHER, and the 2 LOCK WASHERS that hold the SWITCH PLATE to the MOTOR BRACKET.
 - [6] Remove the 2 SCREWS that hold the existing CASSETTE POSITIONING SWITCH and the PAD to the SWITCH PLATE. Discard the SWITCH but **keep the PAD**.
 - [7] Connect the new CASSETTE POSITIONING SWITCH and the existing PAD to the SWITCH PLATE. Use the 2 SCREWS removed in Step [6].
 - [8] To connect the SWITCH PLATE to the MOTOR BRACKET, install the 2 SCREWS, the WASHER, and the 2 LOCK WASHERS removed in Step [3]. Install the WASHER on the **same** SCREW that it was on before. Do not tighten the SCREWS.
 - [9] If you loosened the 4 SCREWS in the base of the INNER HOUSING, tighten these SCREWS.
 - [10] Do the "Adjustment of the Cassette Positioning Switch" procedure on page 9-2.
 - [11] To assemble the CAMERA, reverse the "General Access Procedure" on page 9-1.
- [4] Pull the SWITCH PLATE through the hole in the back of the INNER HOUSING.
- [5] Disconnect the 3 wires from the existing CASSETTE POSITIONING SWITCH and connect them to the corresponding parts of the new SWITCH.

CAUTION

- Do not cause damage to the wires that are connected to the CASSETTE POSITIONING SWITCH.
- If necessary, loosen the 4 SCREWS in the INNER HOUSING. You can now rotate the INNER HOUSING to provide easier access to the SWITCH PLATE. To prevent damage to the GEARS, do **not** fully remove the INNER HOUSING from the CAMERA.



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Figure 30 Replacement of the Cassette Positioning Switch S6

Replacement of the Cassette Positioning Switch S2

- [1] Do the "General Access Procedure" on page 9-1.

WARNING

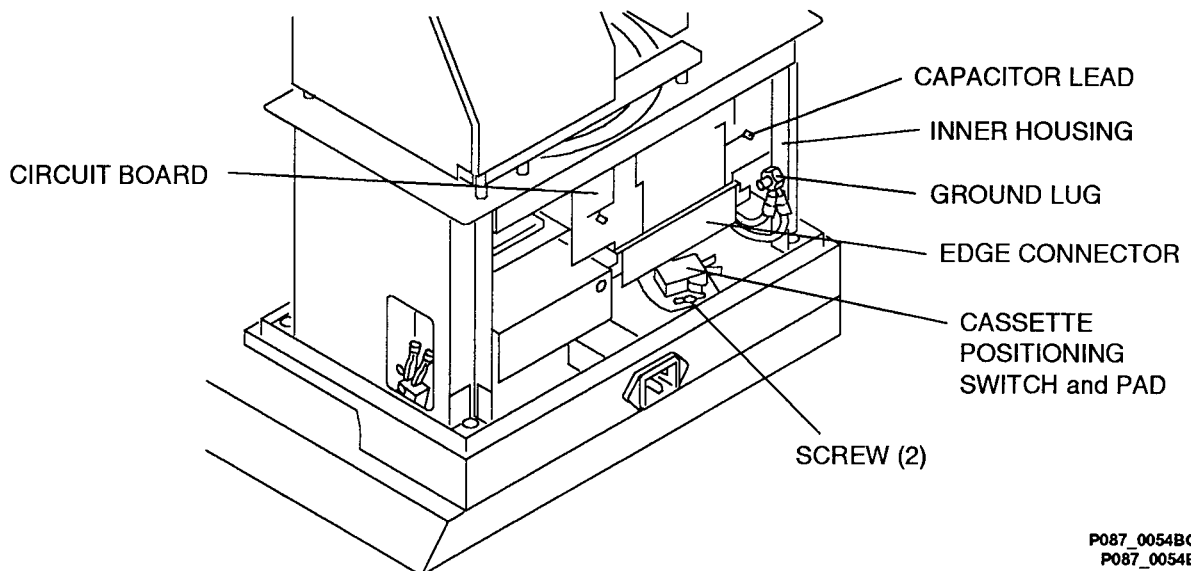
Dangerous voltage. Before you touch the CIRCUIT BOARD, discharge the CAPACITOR to ground.

- [2] Use a wire or metal tool to discharge the CAPACITOR.
- (a) Hold one end of the wire or tool to the CAPACITOR LEAD on the CIRCUIT BOARD.
 - (b) Touch the GROUND LUG on the INNER HOUSING with the other end of the wire or tool.
- [3] Disconnect the EDGE CONNECTOR from the CIRCUIT BOARD for easier access to the SWITCH.

CAUTION

Do not damage the CIRCUIT BOARD.

- [4] Remove the 2 SCREWS, the existing CASSETTE POSITIONING SWITCH, and the PAD. Keep the SCREWS and the PAD.
- [5] Disconnect the 3 wires from the existing CASSETTE POSITIONING SWITCH and connect them to the corresponding parts of the new SWITCH. Discard the existing SWITCH.
- [6] Install the new CASSETTE POSITIONING SWITCH and the existing PAD on the SWITCH PLATE. Use the 2 SCREWS and PAD removed in Step [4]. Install the SCREWS in the 2 holes closest to the rectangular slot in the SWITCH PLATE.
- [7] Connect the EDGE CONNECTOR to the CIRCUIT BOARD.
- [8] Do the "Adjustment of the Cassette Positioning Switch" procedure on page 9-2.
- [9] To assemble the CAMERA, reverse the "General Access Procedure" on page 9-1.

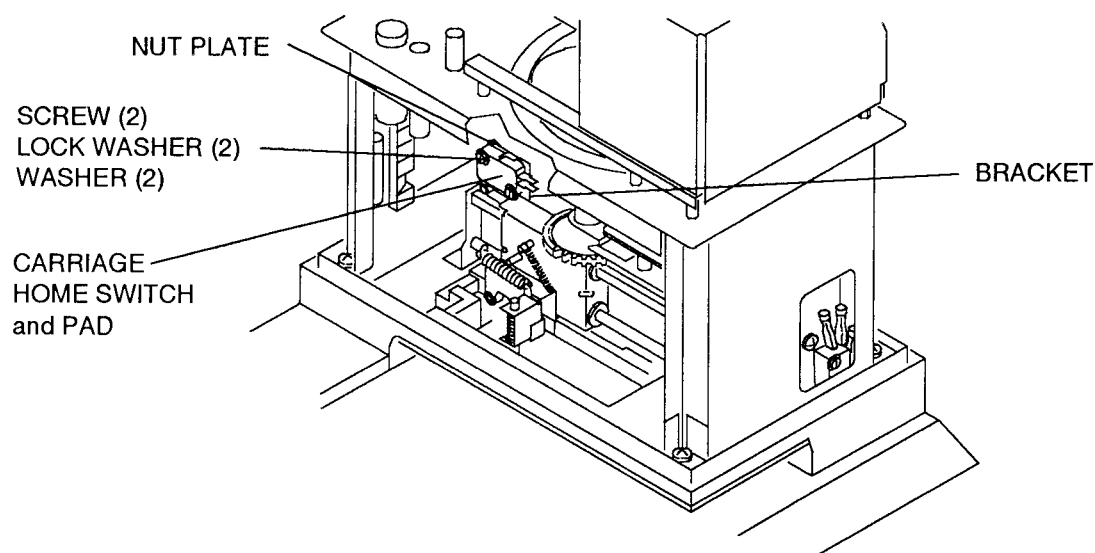


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Figure 31 Replacement of the Cassette Positioning Switch S2

Replacement of the Carriage Home Switch S3

- [1] Do the "General Access Procedure" on page 9-1.
- [2] Remove and keep the 2 SCREWS, the 2 LOCK WASHERS, the 2 WASHERS, and the NUT PLATE that hold the CARRIAGE HOME SWITCH to the BRACKET.
- [3] Remove the existing CARRIAGE HOME SWITCH and the PAD from the BRACKET. Keep the PAD.
- [4] Disconnect the 3 wires from the existing CARRIAGE HOME SWITCH and connect them to the corresponding parts of the new SWITCH.
- [5] Discard the existing CARRIAGE HOME SWITCH.
- [6] Install the new CARRIAGE HOME SWITCH on the BRACKET. Use the 2 SCREWS, the 2 LOCK WASHERS, the 2 WASHERS, the PAD, and the NUT PLATE removed in Step [2].
- [7] Do the "Adjustment of the Carriage Home Switch" procedure on page 9-4.
- [8] To assemble the CAMERA, reverse the "General Access Procedure" on page 9-1.



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Figure 32 Replacement of the Carriage Home Switch S3

Replacement of the Actuator Assembly

- [1] Do the "General Access Procedure" on page 9-1.
- [2] Move the CARRIER ASSEMBLY to the center of the 2 RODS.

IMPORTANT

As you remove the parts, record the number and location of the SHIMS on the SHAFT.

- [3] Remove and keep the ACTUATOR SPRING, the E-RING, and the SHIMS.
- [4] Remove and discard the existing ACTUATOR ASSEMBLY.
- [5] Install the new ACTUATOR ASSEMBLY on the SHAFT. Use the SHIMS and the E-RING from Step [3].
- [6] Do Steps [3] - [6] of the "Adjustment of the Actuator Assembly" procedure that starts on page 9-5.
- [7] Install the ACTUATOR SPRING on the new ACTUATOR ASSEMBLY.

NOTE

- Check that the E-RING seats in the groove of the SHAFT.
 - Check that the ACTUATOR SPRING is installed **through the hole** in the ACTUATOR ASSEMBLY.
- [8] To assemble the CAMERA, reverse the "General Access Procedure" on page 9-1.

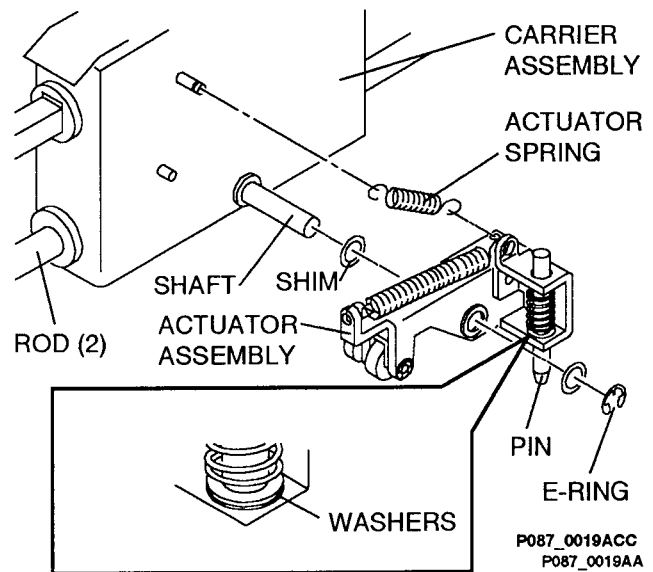


Figure 33 Replacement of the Actuator Assembly

Replacement of the Motor and the Carrier Assembly

- [1] Do the "General Access Procedure" on page 9-1.

WARNING

Dangerous voltage. Before you touch the CIRCUIT BOARD, discharge the CAPACITOR to ground.

- [2] Use a wire or metal tool to discharge the CAPACITOR.
- (a) Hold one end of the wire or tool to the CAPACITOR LEAD on the CIRCUIT BOARD.
 - (b) Touch the GROUND LUG on the INNER HOUSING with the other end of the wire or tool.

- [3] Disconnect the EDGE CONNECTOR from the CIRCUIT BOARD.

- [4] Remove the 3 SCREWS, the SPACER, and the CIRCUIT BOARD.

CAUTION

Do not damage the wires that are connected to the INNER HOUSING.

- [5] Cut the CABLE TIE below the CIRCUIT BOARD.

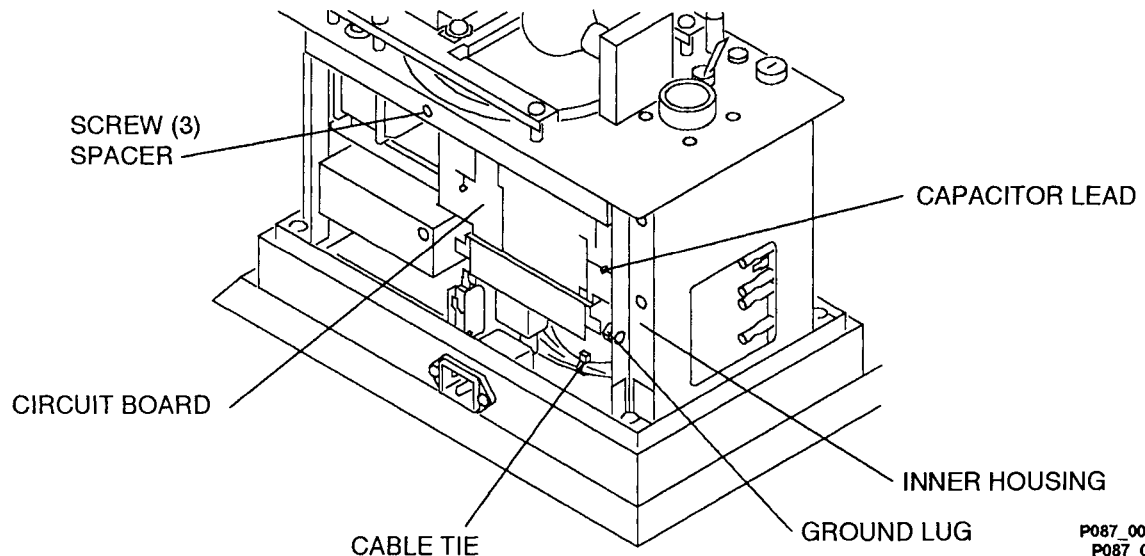
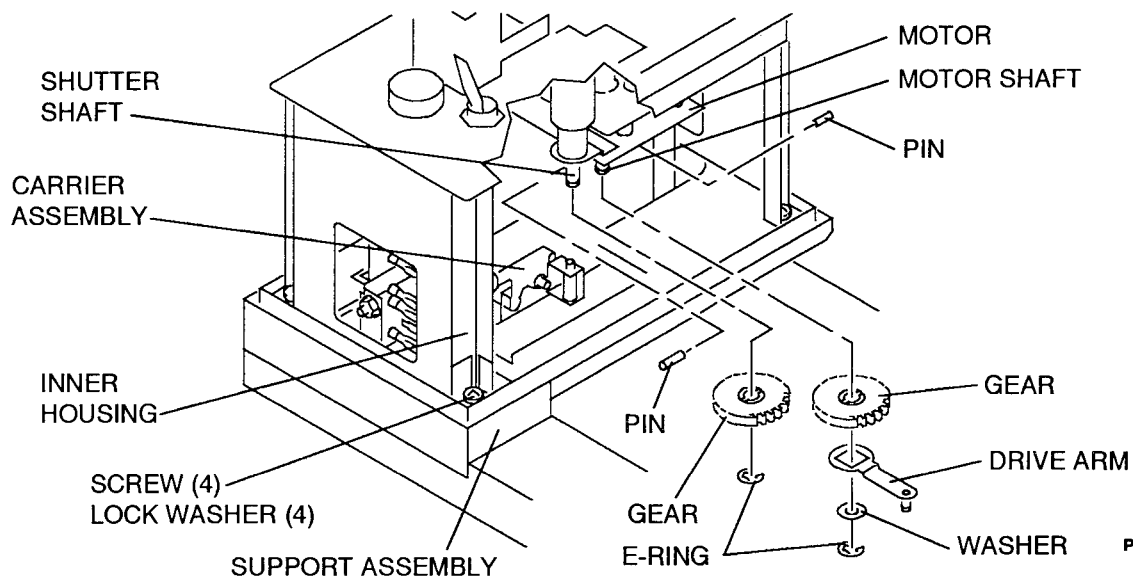


Figure 34 Removing the Circuit Board

- [6] Remove and keep the E-RING, the GEAR, and the PIN from the SHUTTER SHAFT.
- [7] Remove and keep the E-RING, the WASHER, the DRIVE ARM, the GEAR, and the PIN from the MOTOR SHAFT.
- [8] Remove and keep the 4 SCREWS and the 4 LOCK WASHERS that hold the INNER HOUSING to the SUPPORT ASSEMBLY.
- [9] To provide easier access to the MOTOR and the CARRIER ASSEMBLY, pull the INNER HOUSING up and toward the back of the CAMERA.

IMPORTANT

To install only a new CARRIER ASSEMBLY or new RODS, advance to Step [14]. To install a new MOTOR, continue with Step [10].



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P087_0044BC

Figure 35 Removing the Gears

[10] Remove and keep the white INSULATOR from the top of the MOTOR. Record the colors and positions of the connections for the wires on the top of the MOTOR.

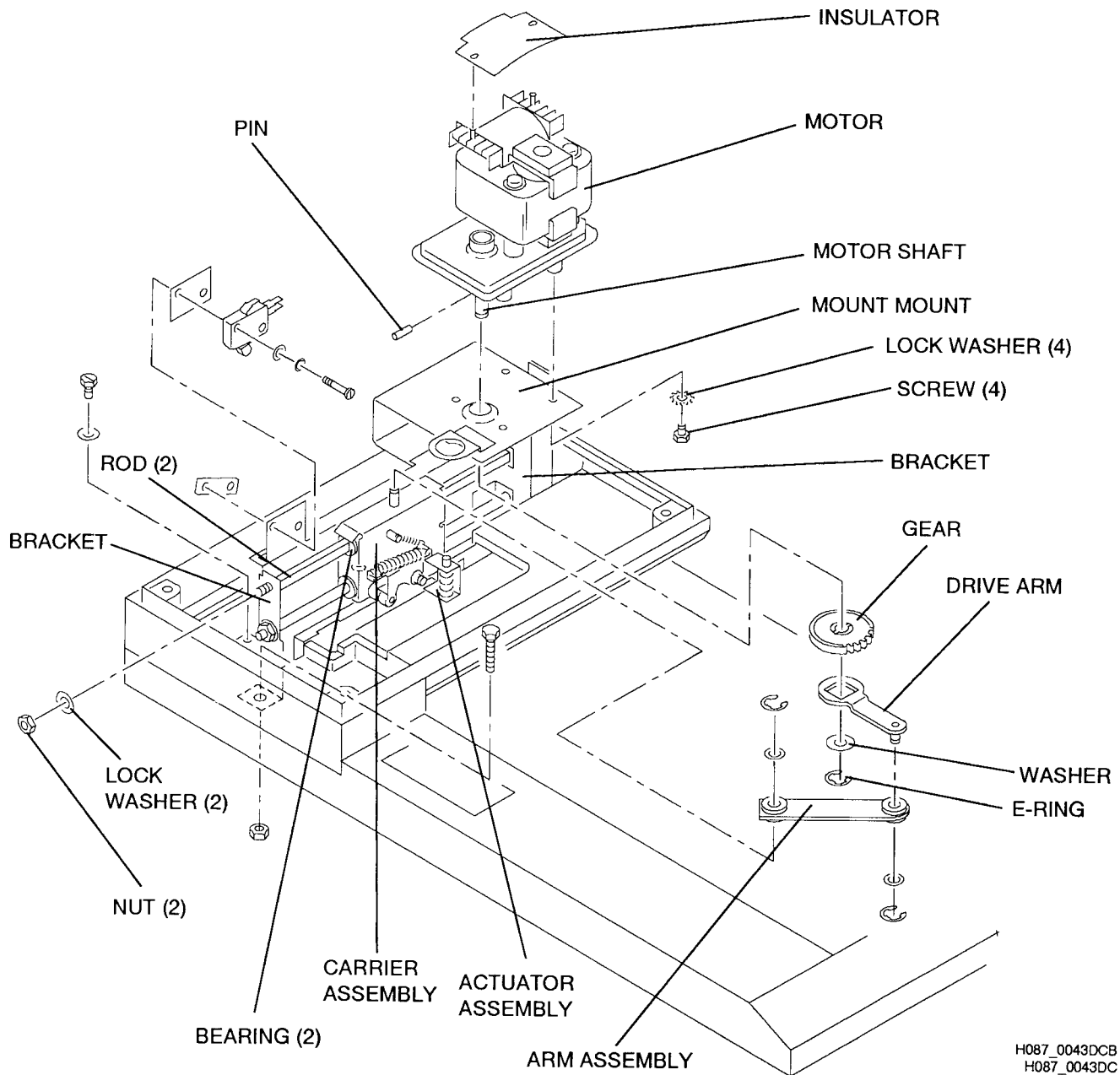
[11] Remove the 2 wires.

[12] Remove the 4 SCREWS and 4 LOCK WASHERS that hold the MOTOR to the MOTOR MOUNT.

NOTE

These 4 SCREWS are installed through the **bottom** of the MOTOR MOUNT into the MOTOR.

[13] Discard the MOTOR.



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H087_0043DC

Figure 36 Replacement of the Motor and the Carrier Assembly

IMPORTANT

To install only a new MOTOR, advance to Step [23]. To install new RODS or a new CARRIER ASSEMBLY, continue with Step [14].

- [14] Move the CARRIER ASSEMBLY to the center of the RODS.
- [15] Remove and keep the NUT and the LOCK WASHER from the left end of each ROD.
- [16] To remove the RODS from the left BRACKET, move the RODS to the right.
- [17] To remove the RODS from the right BRACKET, pull the RODS forward and to the left.
- [18] Remove the RODS, the CARRIER ASSEMBLY, and the ACTUATOR ASSEMBLY from the CAMERA.
- [19] Pull the RODS from the CARRIER ASSEMBLY.
- [20] Install the necessary new parts.

CAUTION

The holes in the 2 BUSHINGS for the square rod are not square. When you install the BUSHINGS on the square ROD on either side of the CARRIER ASSEMBLY, the play in the 2 BUSHINGS **must be on the top and bottom of the ROD**. If you install the BUSHINGS with the play on the sides of the ROD, the ROD may bend.

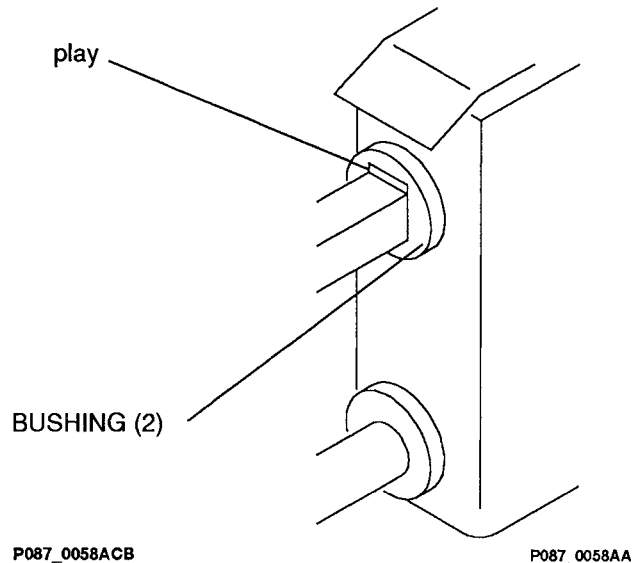


Figure 37 Play in the Bushings

- [21] To install the RODS, the CARRIER ASSEMBLY, and the ACTUATOR ASSEMBLY, reverse Steps [15] - [19].
- [22] Check that the CARRIER ASSEMBLY moves freely across the RODS.

IMPORTANT

To install a new MOTOR, continue with Step [23]. **If not**, advance to Step [26].

- [23] Connect the new MOTOR to the MOTOR MOUNT. Use the 4 SCREWS and 4 LOCK WASHERS removed in Step [12].
- [24] Install the 2 wires removed in Step [11].
- [25] Install the INSULATOR on the top of the new MOTOR.

- [26] Move the INNER HOUSING to its normal position.
- [27] Install the 4 LOCK WASHERS and the 4 SCREWS removed in Step [8].
- [28] Install the PIN, the GEAR, the DRIVE ARM, the WASHER, and the E-RING on the MOTOR SHAFT.

NOTE

- The raised center of the GEAR must be down.
- The concave side of the E-RING must be toward the GEAR.

- [29] Use the 3 SCREWS and the SPACER from Step [4] to install the CIRCUIT BOARD.
- [30] Connect the EDGE CONNECTOR to the CIRCUIT BOARD.
- [31] Install a new CABLE TIE.

IMPORTANT

You **must** do Steps [32] - [36] to set the timing of the SHUTTER.

- [32] Move the CARRIER ASSEMBLY fully to the right side of the 2 RODS.

- [33] Align the DRIVE ARM directly over the ARM ASSEMBLY. Hold them in this position during Steps [34] - [36].

- [34] Be sure you can see the shutter hole in the COVER GLASS. Insert the PIN into the SHUTTER SHAFT.

- [35] Install the GEAR on the SHUTTER SHAFT with the raised center of the GEAR up. Rotate this GEAR until it engages the GEAR on the MOTOR SHAFT.

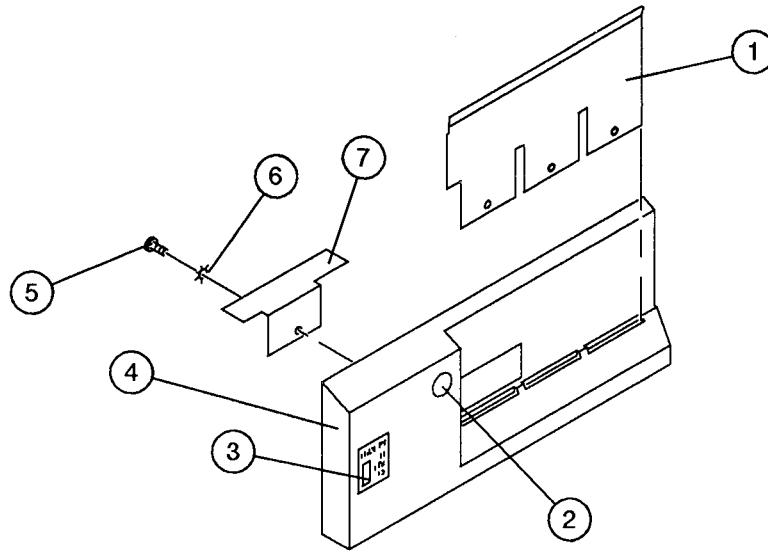
IMPORTANT

The concave side of the E-RING **must** be toward the GEAR.

- [36] Install the E-RING on the SHUTTER SHAFT with the concave side of the E-RING toward the GEAR.

- [37] To assemble the CAMERA, reverse the "General Access Procedure" on page 9-1.

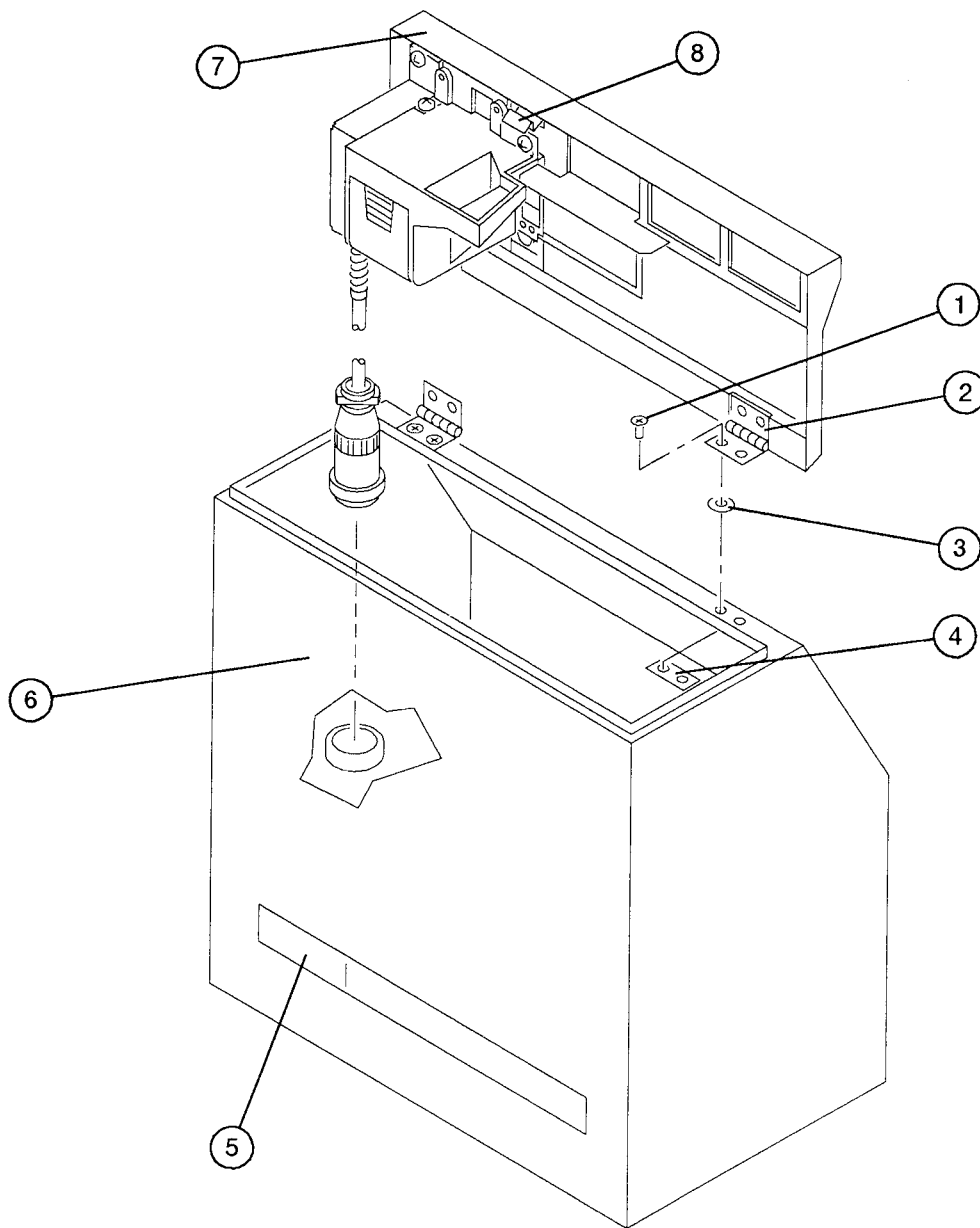
SECTION 10 **Illustrated Parts List**



P087_0042BCA
P087_0042BC

Item	Part No.	Description	Qty.	Notes
1	246515	Holder - Card	1	Includes: cover, exposure indicator, clip, and labels
2	246520	Indicator - Exposure, Lens.....	1	
3	514729	Label - Plate.....	1	
4	246500	Cover Assembly	1	
5	122795	Screw	3	
6	116297	Washer - Lock.....	3	
7	264678	Reflector	1	

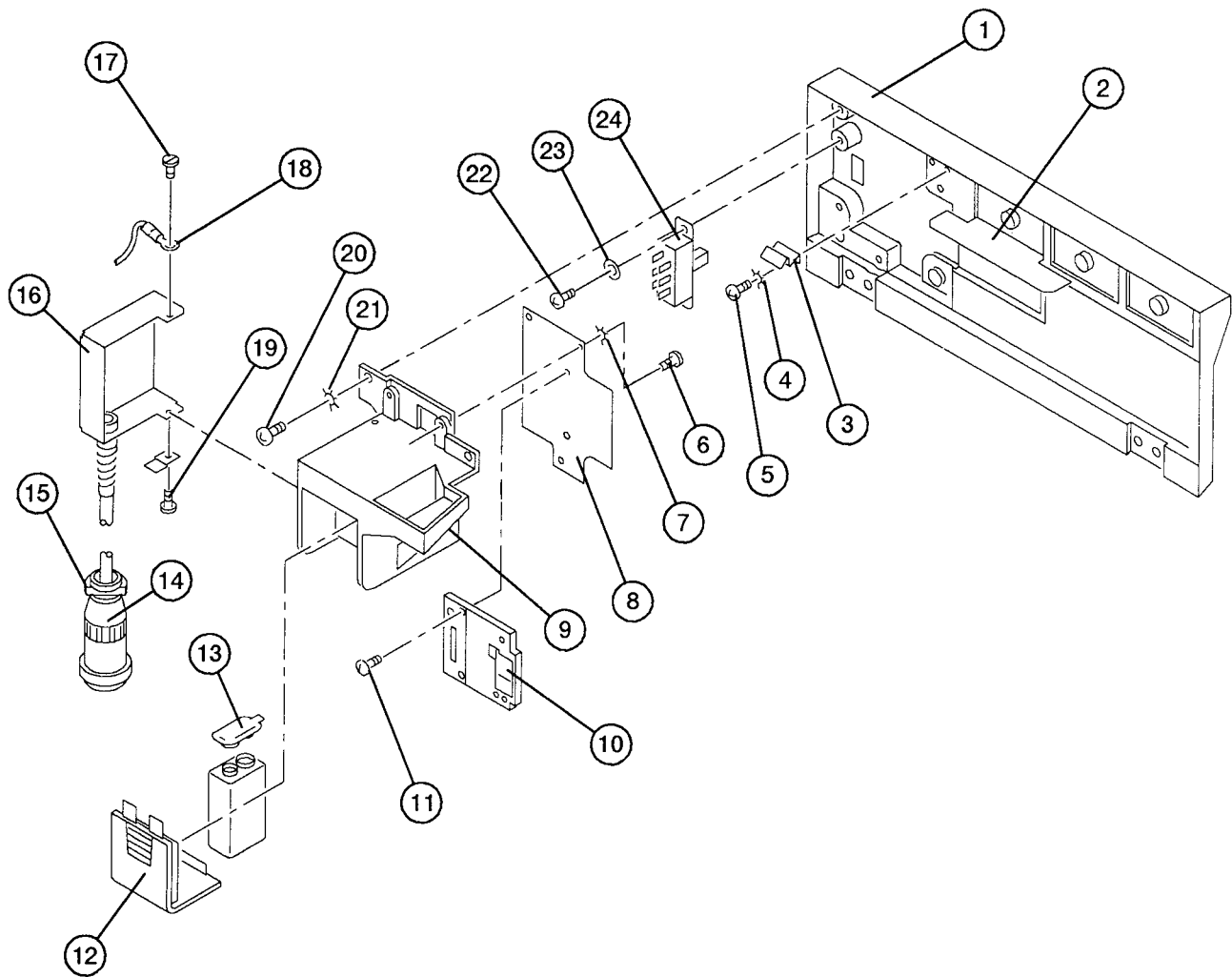
Figure 38 Cover Assembly
Order by Part Number



H087_0071DCA
H087_0071DC

Item	Part No.	Description	Qty.	Notes
1	101515	Screw	4	Includes: cover, exposure indicator, clip, and labels
2	514767	Hinge	2	
3	058481	Washer	4	
4	520456	Plate - Nut.....	2	
5	911206	Nameplate - Model 2, 2-L, and 2-L60 Cameras	1	
6	240775	Housing - Outer	1	
7	246500	Cover Assembly.....	1	
8	246523	Latch.....	1	

Figure 39 Outer Housing and Cover
Order by Part Number

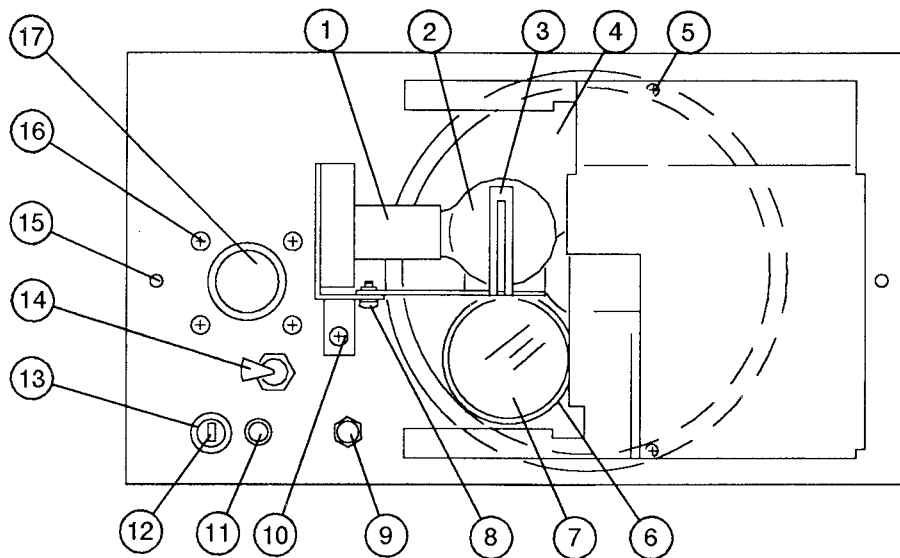


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H087_0072DC

Figure 40 Inside of the Cover
Order by Part Number

Item	Part No.	Description	Qty.	Notes
1	246500	Cover Assembly	1	Includes: cover, exposure indicator, clip, and labels
2	264678	Reflector	1	
3	514775	Latch.....	1	
4	109291	Washer - Lock.....	2	
5	122701	Screw	2	
6	122700	Screw	3	
7	109291	Washer - Lock.....	3	
8	261172	Bracket - Clock Mounting	1	
9	246501	Mirror Mount.....	1	
10	748675	Clock	1	
11	264470	Screw	2	
12	246502	Lid - Battery	1	
13	264469	Clip - Battery	1	
14	264677	Cable and Switch Assembly	1	
15	122701	Screw	2	
	049402	Washer - Lock.....	3	
16	264696	Switch - Cover	3	
17	122700	Screw	1	
18	109291	Washer - Lock.....	1	
19	191097	Screw	1	
20	131290	Screw	3	
21	121213	Washer - Lock.....	3	
22	122701	Screw	2	
23	049402	Washer - Lock.....	2	
24	189241	Switch.....	1	S5

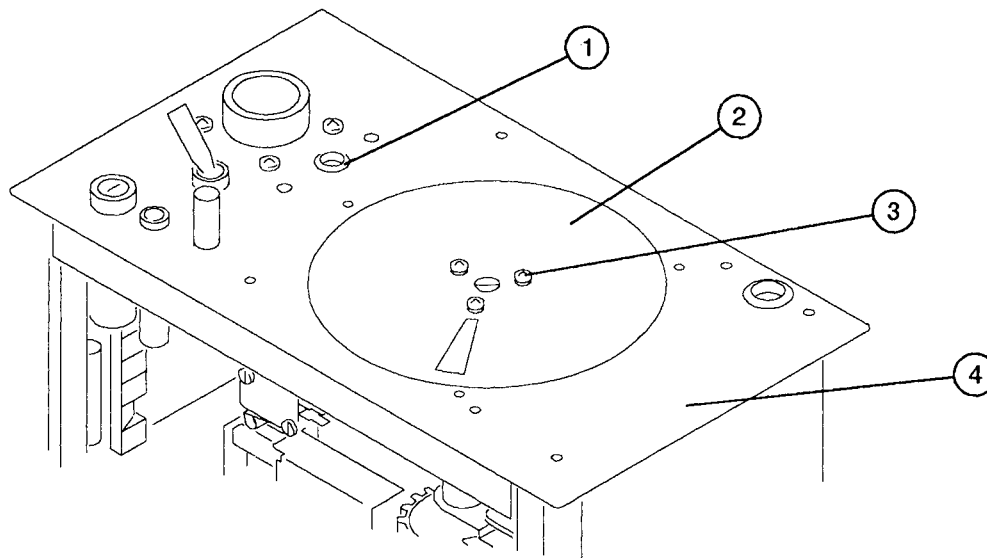
Figure 40 Inside of the Cover
Order by Part Number



P087_0052BCA
P087_0052BC

Item	Part No.	Description	Qty.	Notes
1	190070	Socket - Lamp.....	1	Includes: disk cover, glass cover, and seal
2	521417	Lamp	1	
3	514773	Integrator.....	1	
4	520110	Cover - Shutter Disk	1	
5	122701	Screw	3	
	109291	Washer - Lock.....	3	
6	514725	Seal	1	
7	520487	Glass - Cover, and Seal	1	
8	122795	Screw	2	R4
9	521666	Rheostat.....	1	
	190044	Cap.....	1	
10	138771	Screw	4	
11	482118	Light - Pilot, for Model 2-L, 2-L60, and <i>Min-R</i> L Cameras	1	FS1
12	476330	Holder - Fuse	1	
	476332	Carrier - Fuse, for Model 2-L, 2-L60, and <i>Min-R</i> L Cameras	1	
	477506	Carrier - Fuse, for Model 2 and <i>Min-R</i> Cameras	1	
	851345	Fuse - for Model 2 and <i>Min-R</i> Cameras	1	S4
	476331	Fuse - for Model 2-L, 2-L60, and <i>Min-R</i> L Cameras	1	
13	489174	Washer	1	
14	476329	Switch.....	1	
15	891963	Screw	2	
	539180	Washer	2	
16	131290	Screw	4	
	121213	Washer - Lock.....	4	
	042533	Nut.....	4	J1
17	558648	Connector.....	1	

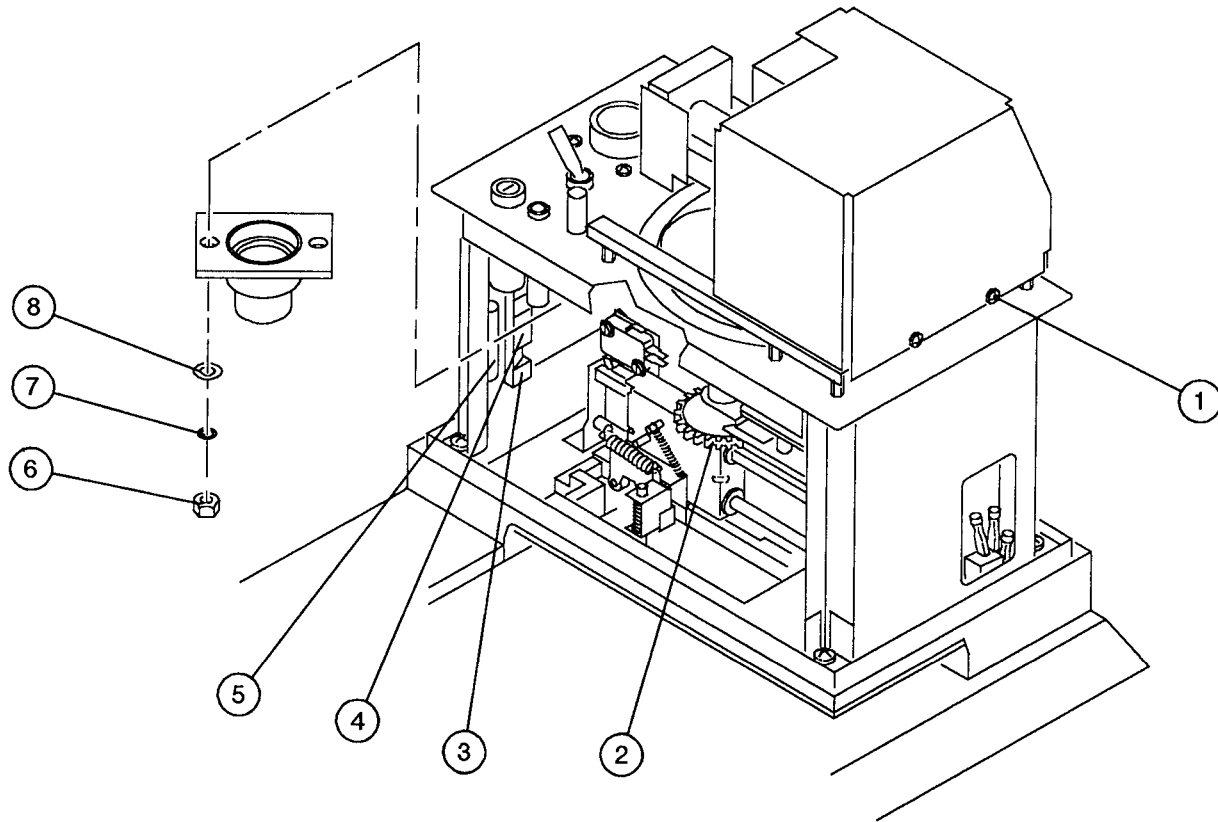
Figure 41 Lamp Area
Order by Part Number



H087_0046BCA
H087_0046BC

Item	Part No.	Description	Qty.	Notes
1	156541	Grommet - for Model 2-L, 2-L60, and <i>Min-R</i> L Cameras	2	
2	514752	Disk - Shutter	1	
3	122700	Screw	3	
	109291	Washer - Lock.....	3	
4	476319	Housing - Lower.....	1	

Figure 42 Shutter Disk
Order by Part Number

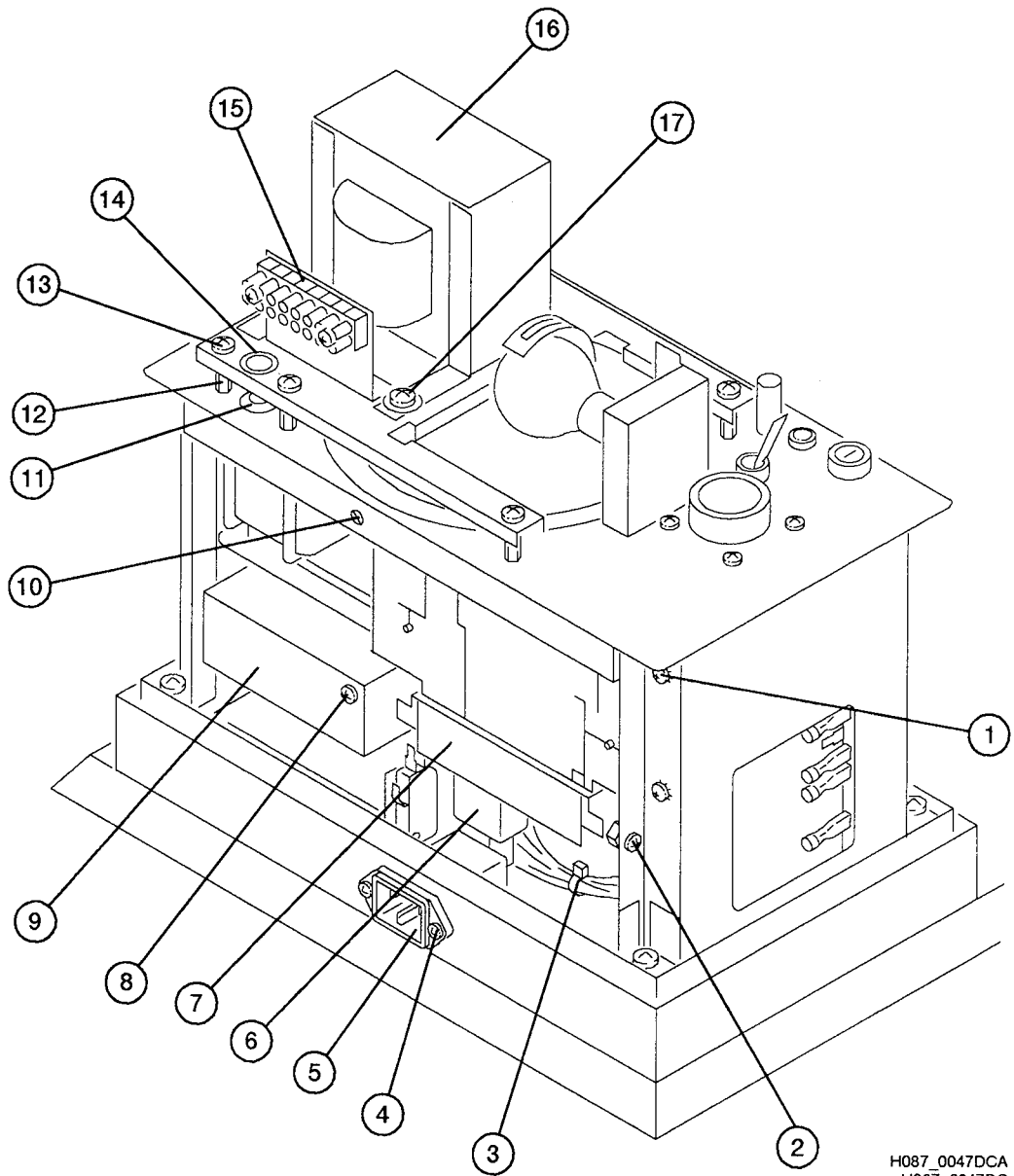


P087_0035DCA
P087_0035DC

Figure 43 Camera Interior, Front
Order by Part Number

Item	Part No.	Description	Qty.	Notes
1	122795	Screw	3	Package of 10 R5
2	520117	Gear - 42-Tooth	2	
	175760	Ring	1	
	176250	Pin	1	
3	122759	Screw	2	
	078628	Washer - Lock.....	2	
	042533	Nut.....	2	
4	788603	Block - Terminal.....	1	
5	533799	Resistor	1	
6	043609	Nut.....	2	
7	142588	Washer - Lock.....	2	
8	058481	Washer	2	

Figure 43 Camera Interior, Front
Order by Part Number

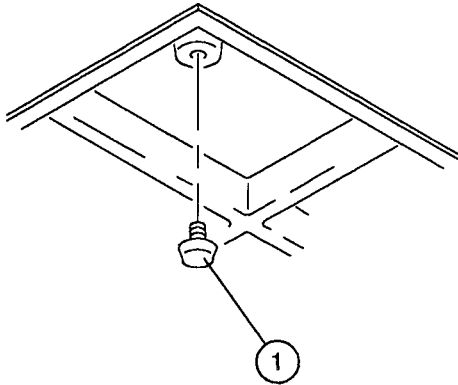


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H087_0047DC

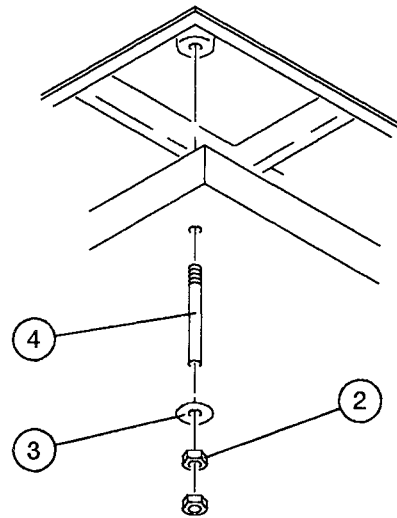
Figure 44 Camera Interior, Back
Order by Part Number

Item	Part No.	Description	Qty.	Notes
1	122701	Screw	2	With EMI Line Filter C2
	109291	Washer - Lock.....	2	
2	122715	Screw	1	
	055776	Washer - Lock.....	1	
	028318	Nut.....	1	
3	182590	Tie - Cable	17	
4	131290	Screw	2	
	116297	Washer - Lock.....	2	
5	616122	Receptacle - for Model 2 and <i>Min-R</i> Cameras	1	
	476334	Receptacle - for Model 2-L, 2-L60, and <i>Min-R</i> L Cameras	1	
6	476378	Capacitor	1	TB2
7	530045	Connector.....	1	
8	122715	Screw	1	
	055776	Washer - Lock.....	1	
	028318	Nut.....	1	
9	520111	Mount - Motor	1	
10	189244	Screw	1	
	336373	Spacer.....	1	
	NOTE: The following items are for Model L Cameras only.		
11	167420	Grommet	1	
12	476316	Spacer	6	
13	122706	Screw	6	
14	476317	Bushing	2	
15	571831	Block - Terminal.....	1	
16	482325	Transformer.....	1	
17	122799	Screw	4	
	526004	Washer.....	4	

Figure 44 Camera Interior, Back
Order by Part Number

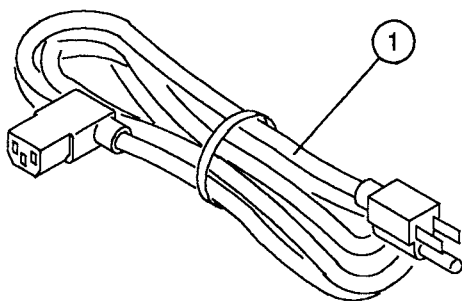


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P087_0023AC

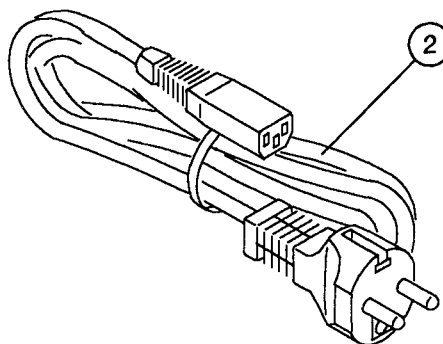


P087_0024ACB
P087_0024AC

Item	Part No.	Description	Qty.	Notes
1	489178	Foot Assembly	4	Includes screw and rubber tip
2	034269	Nut.....	8	
3	046902	Washer.....	4	
4	189249	Rod - Threaded.....	4	



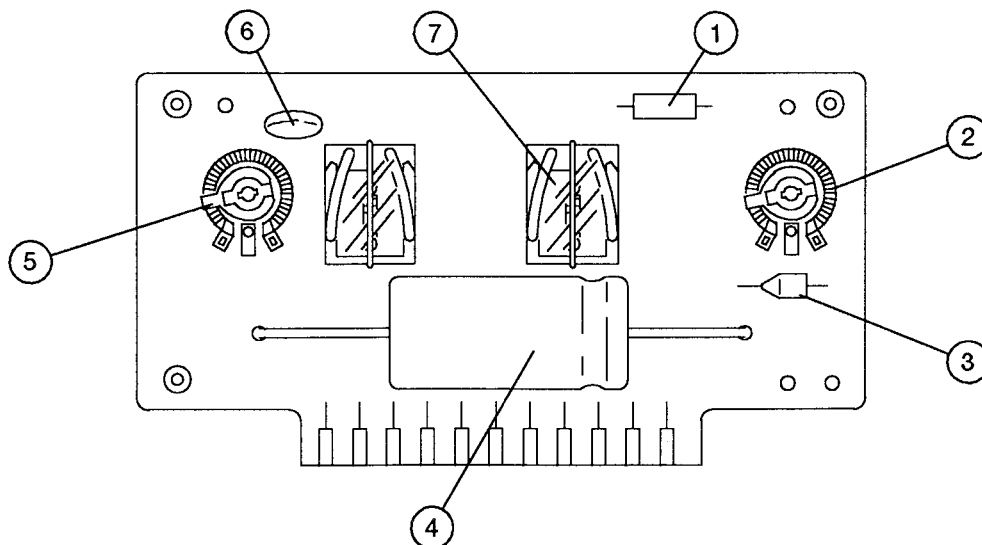
P087_0037ACA
P087_0037AC



P087_0048ACA
P087_0048AC

Item	Part No.	Description	Qty.
1	616289	Power Cord - for Model 2 and <i>Min-R</i> Cameras.....	1
2	476324	Power Cord - for Model 2-L, 2-L60, and <i>Min-R</i> L Cameras.....	1

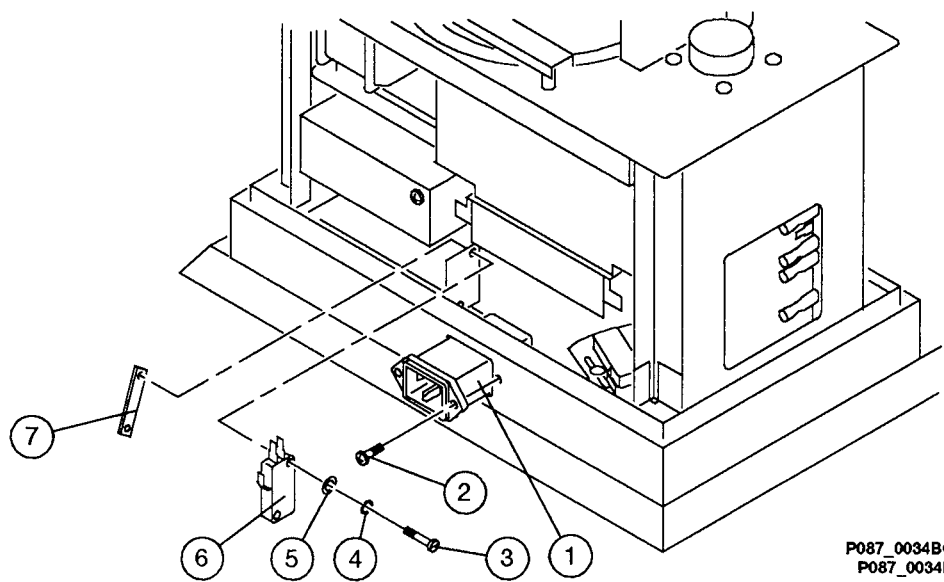
Figure 46 Power Cords
Order by Part Number



P087_0049BCA
P087_0049BC

Item	Part No.	Description	Qty.	Notes
	562956	Circuit Board and Components	1	
1	168188	Resistor	1	R1
2	498705	Rheostat.....	1	R3
3	163956	Diode.....	1	CR1
4	189232	Capacitor	1	C1
5	498706	Rheostat.....	1	R2
6	589661	Varistor	1	RV1
7	616071	Relay	2	K1 and K2

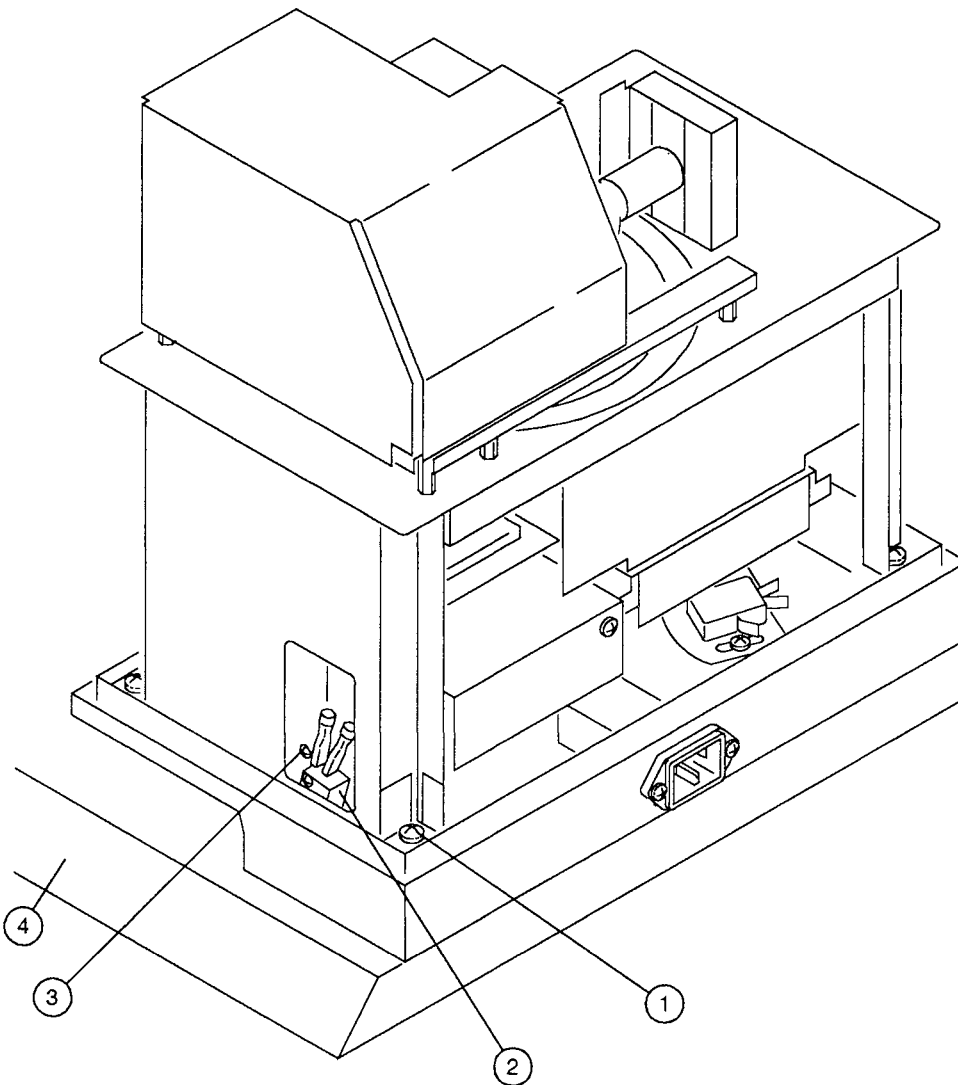
Figure 47 Circuit Board Assembly
Order by Part Number



P087_0034BCB
P087_0034BC

Item	Part No.	Description	Qty.	Notes
1	616122	Receptacle - for Model 2 and <i>Min-R</i> Cameras	1	S1
	476334	Receptacle - with EMI Line Filter, for Model 2-L, 2-L60, and <i>Min-R</i> L Cameras	1	
2	131290	Screw	2	
	116297	Washer - Lock.....	2	
3	122730	Screw	2	
4	851137	Washer - Lock.....	2	
5	128531	Washer.....	2	
6	476350	Switch.....	1	
7	514759	Plate - Nut.....	1	

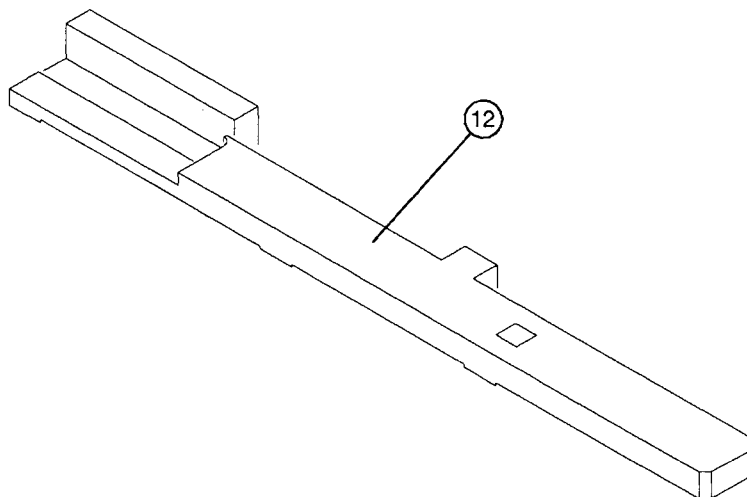
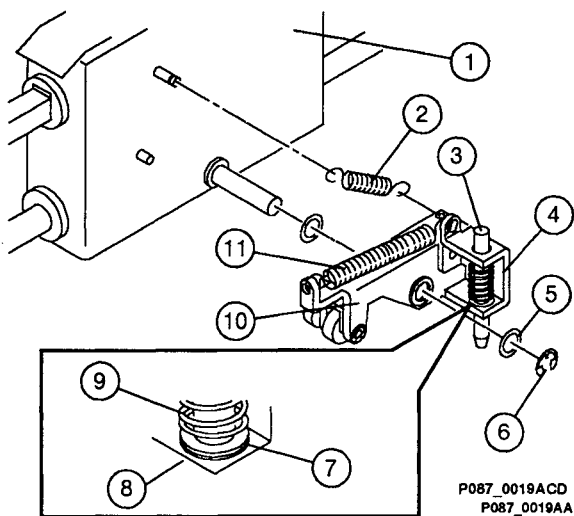
Figure 48 Switch S1 Assembly
Order by Part Number



P087_0029DCA
P087_0029DC

Item	Part No.	Description	Qty.	Notes
1	122706	Screw	4	S2 or S6
	850897	Washer - Lock.....	4	
	058481	Washer	4	
2	476351	Switch.....	1	
	511565	Pad.....	1	
3	122721	Screw	2	
	078628	Washer - Lock.....	2	
4	264466	Base and Support Assembly	1	

Figure 49 Switch S6 Assembly
Order by Part Number



H087_0070BCA
H087_0070BC

Item	Part No.	Description	Qty.	Notes
1	542074	Actuator Assembly	1	Includes: Items 3, 4, 7, 8, 9, 10, and 11
	514757	Carrier Assembly.....	1	
2	514726	Spring - Actuator.....	1	Includes carrier, shafts, studs, bushings, retaining rings
3	542073	Pin	1	
4	514717	Pivot Assembly.....	1	
5	123030	Washer - 0.005-in. Thick	2	
	093649	Shim - Washer, 0.015-in. Thick.....	1	
6	162786	Ring	1	
7	064893	Washer - 0.005-in. Thick	1	
	093649	Shim - Washer, 0.015-in. Thick.....	1	
8	148133	Ring	1	
9	189227	Spring	1	
10	528483	Support.....	1	
11	189227	Spring	1	
12	1C0071	Tool - Pin Adjustment	1	

Figure 50 Carrier and Actuator Assemblies
Order by Part Number

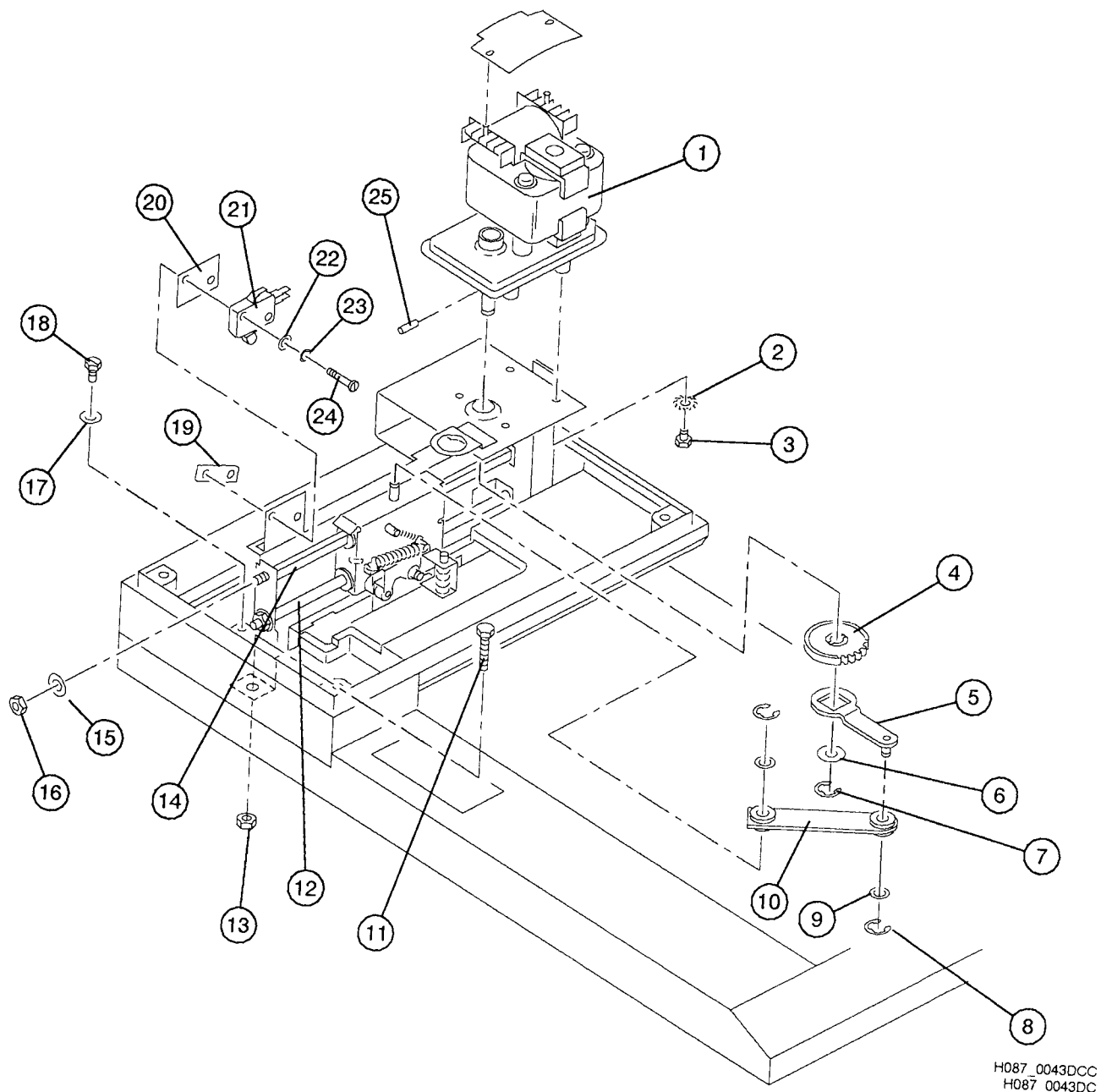
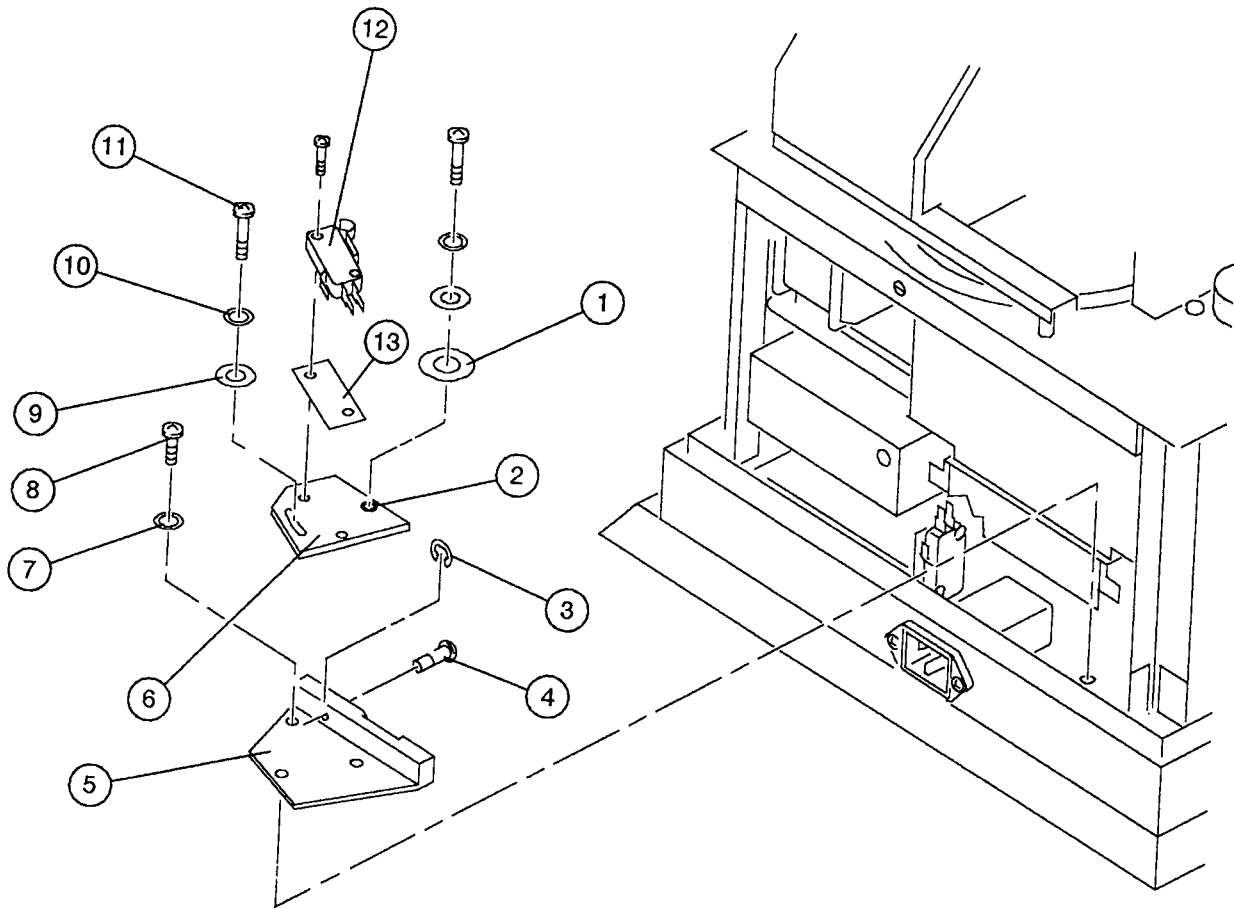
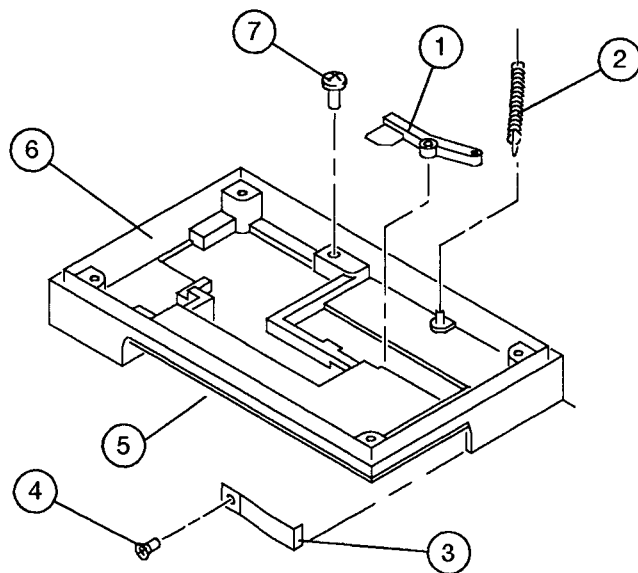


Figure 51 Motor and Carrier Assembly
Order by Part Number



P087_0050DCA
P087_0050DC

Item	Part No.	Description	Qty.	Notes
1	132154	Washer	1	S2 or S6
2	553512	Bushing	1	
3	122394	Ring - Retaining	1	
4	553511	Piston	1	
5	553510	Plate - Block.....	1	
6	240656	Plate	1	
7	078628	Washer - Lock.....	1	
8	122721	Screw	1	
9	886890	Washer	2	
10	078628	Washer - Lock.....	2	
11	122713	Screw	2	
12	476351	Switch	1	
13	511565	Pad.....	1	



P087_0053BCA
P087_0053BC

Item	Part No.	Description	Qty.	Notes
1	520104	Latch.....	1	Includes: spring, back plate, and stop
2	514733	Spring	1	
3	514781	Spring Assembly	1	
4	101390	Screw	1	
5	514770	Plush	1	
6	476321	Support - Housing	1	
7	134799	Screw	1	

Figure 53 Support Assembly
Order by Part Number

SECTION 11

Numerical Parts List

Part Number	Description	Figure Number
028318	Nut	44
031576	Nut	51
034269	Nut	45
042533	Nut	41, 43
043609	Nut	43
046902	Washer	45
049402	Washer - Lock	40
055776	Washer - Lock	44
058481	Washer	39, 43, 49
064893	Washer - 0.005-in. Thick	50
078628	Washer - Lock	43, 49, 52
093649	Shim - Washer, 0.015-in. Thick	50
101390	Screw	53
101515	Screw	39
109291	Washer - Lock	40, 41, 42, 44
116297	Washer - Lock	38, 44, 48
121213	Washer - Lock	40, 41
121214	Washer - Lock	51
122394	Ring - Retaining	52
122700	Screw	40, 42
122701	Screw	40, 41, 44
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476316	Spacer	44
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182590	Tie - Cable.....	44
1C0071	Tool - Pin Adjustment.....	50
482325	Transformer	44
589661	Varistor	47
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132154	Washer	52
138210	Washer	51
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SECTION 13

New Equipment Warranty

Kodak warrants the *Kodak X-Omatic* Identification Cameras and the *Kodak Min-R* Identification Cameras to function properly for one year from date of initial installation, when installed within one year from the date of shipment.

Warranty Repair Coverage

If this equipment does not function properly during the warranty period, the dealer in *Kodak X-Omat* Processors who sold the equipment will provide or arrange for repair of the equipment during the dealer's normal working hours. Such repair service will include any necessary adjustments and/or replacement of parts necessary to maintain your equipment in good working order.

How to Obtain Service

Should equipment require service, refer to the sales contract for details on whom to call for service, or contact the dealer in *Kodak X-Omat* Processors who sold the equipment.

Limitations

Warranty service is limited to the contiguous United States, the island of Oahu in Hawaii, and certain areas of Alaska.

This warranty does not cover: circumstances beyond Kodak's control; misuse; abuse; any attachments, accessories, or alterations not marketed by Kodak (including service or parts to correct problems resulting from the use of such attachments, accessories or alterations); failure to follow Kodak's operating instructions; or supply items.

Kodak makes no other warranties, express, implied, or of merchantability for this equipment.

Repair without charge is Kodak's and the dealer's only obligation under this warranty. ***Kodak will not be responsible for any consequential or incidental damages resulting from the sale, use, or improper functioning of this equipment even if loss or damage is caused by the negligence or other fault of Kodak.*** Such damages for which Kodak will not be responsible, include, but are not limited to, loss of revenue or profit, downtime costs, loss of use of the equipment, cost of any substitute equipment, facilities or services or claims of your customers for such damages.

This limitation of liability will not apply to claims for injury to persons or damage to property caused by the sole negligence or fault of Kodak or by persons under its direction or control.

Publication Change Table

Revision Date	PCN No.	Pub. No.	Affected Pages	Filename	Description
1/91		635829	all	3202sg_a.txt	First printing for Models 2 and 2-L.
1/92		968362	all	3202sg_a.txt	Revision to add <i>Min-R</i> Camera.
7/92	1	PCN Pub. No. 990600	10-17, 10-18, 11-1, 11-2, 11-3, 11-4, 12-1, 12-2, 12-3, 12-4, 13-1	3202sg_a_rev1.txt	Part Numbers and Descriptions Changed.
28JUL1994		1C7073	all	3202sm_b.txt	Revision to add Model 2-L60 and <i>Min-R</i> L Cameras. ECO 2537-128.

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